FEBRUARY 1954

PRECISION METAL MOLDING

INCLUDING DIE CASTINGS MAGAZINE

DIE CASTINGS
INVESTMENT CASTINGS
POWDER METALLURGY
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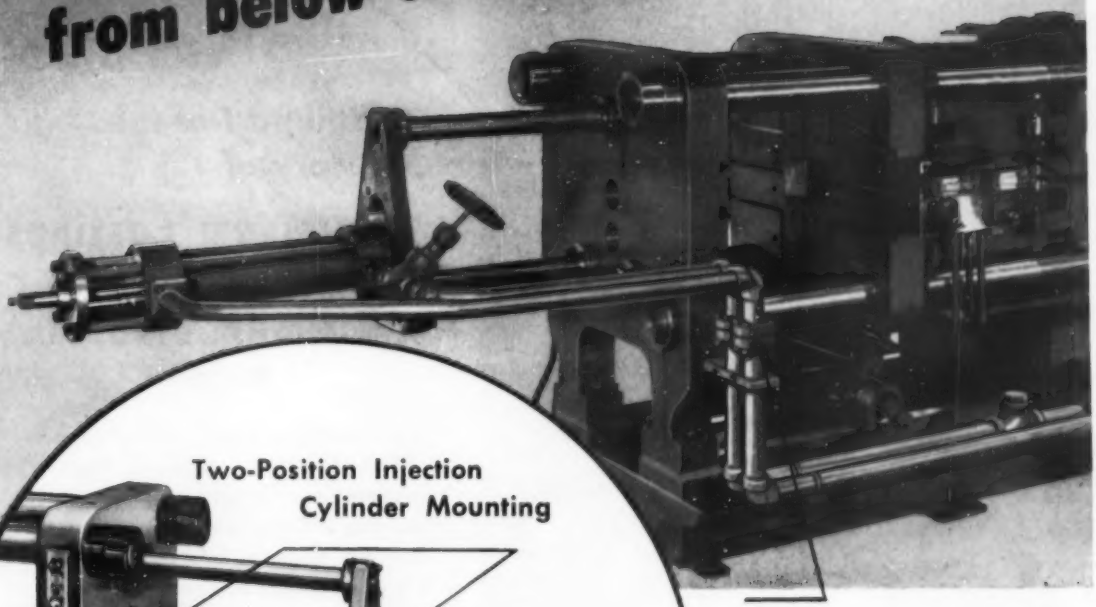
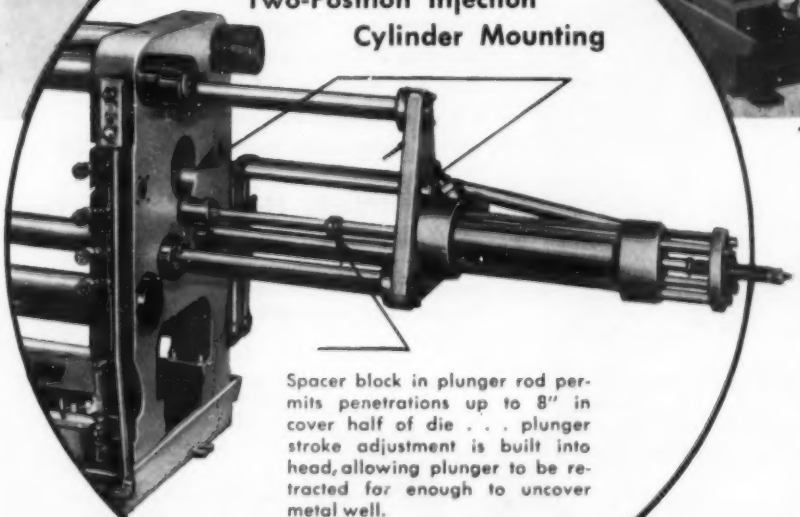
Another CAST-MASTER BONUS feature

FAST, EFFICIENT CHANGE-OVER from below center to center shot!



Two-Position Injection Cylinder Mounting



Spacer block in plunger rod permits penetrations up to 8" in cover half of die . . . plunger stroke adjustment is built into head, allowing plunger to be retracted far enough to uncover metal well.

When changing from below center to center shot, simple addition of extra section of pipe eliminates the use of hose or flexible tubing, thereby affording an extra measure of safety.

In modern production, time means money. That's why leading die casters praise the exclusive features shown here, which permit rapid change-over without sacrificing safety. To learn about other Cast-Master "bonus" features, send for the new, complete catalog giving illustrations and specifications on eight great new models.

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CAST-MASTER Inc. 2123 HAMILTON AVE. CLEVELAND 14, OHIO

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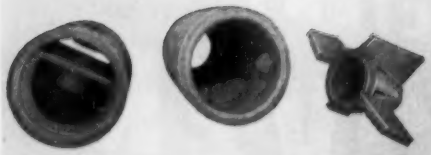


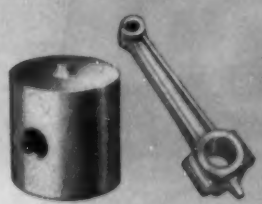
These are parts of the casing for a new underwater guided missile, sand cast in the foundries of Aluminum Industries, Inc.

This big sand casting is a part for bakery equipment that will eventually find its way into a GI kitchen.

Aluminum sand casting, light-weight yet strong, is ideal for this Supercharger housing. This is for a conventional propeller aircraft.

This main housing is one of seven parts of a fuel pump sand cast by Aluminum Industries, Inc. for aircraft application.

Washing machine agitators, cast by the permanent mold process, are a peacetime product of the Aluminum Industries, Inc. foundries.



Pistons of all types are cast by Aluminum Industries, Inc. This small piston and the connecting rod are permanent mold castings for small utility engines.

Compressor casing for jet aircraft engine. Exceptionally large permanent mold castings, weight 130 lbs. each. Aluminum Industries, Inc. casts numerous parts for the J-47.

weapons... washers... and wheels

A little part of the big story of

Aluminum Castings

produced in

ALUMINUM INDUSTRIES

Foundries

● Manufacturers in many different lines of civilian and defense production often are able to speed output or reduce costs, or both, by changing to lightweight aluminum castings by Aluminum Industries, Inc. Our engineers will gladly consult with you and make recommendations on your parts requirements.

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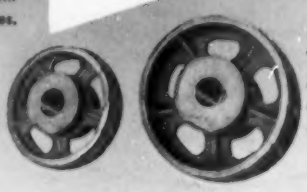

The diversity of castings produced in Aluminum Industries, Inc. foundries is endless. These aluminum sand castings are caster wheels for industrial trucks.

PERMITE Aluminum Castings

ALUMINUM PERMANENT MOLD and SAND CASTINGS . . . HARDENED, GROUND and FORGED STEEL PARTS

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. . . and when it comes to producing complex die cast parts we have that valuable experience

As a matter of fact, if you were to call on us at our plant, you would be impressed with the wide variety of zinc and aluminum die castings we are producing.

We have made big die castings, but can save money for you on the little ones as well.

We make complex castings to meet your specs, and give the same careful attention to simple castings.

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LETTERS TO THE EDITOR

PRE-PRODUCTION DIE CASTINGS

Perhaps one of the most promising applications of the investment casting business is in making up pre-production models of items scheduled for die casting.

As a designer, this appeals to me from a number of standpoints, for patterns are fairly readily made and altered, so a few preliminary models should not cost a great sum to prove out the idea and the drawings.

Yet, I have still to find a source that will quote on one or a very few models.

Do you know of such a source? I'm working up a design now that will use two, perhaps three fairly complicated die castings. I'd not only like to check the design itself, but prove the material (Zamak or Aluminum?) with life tests.

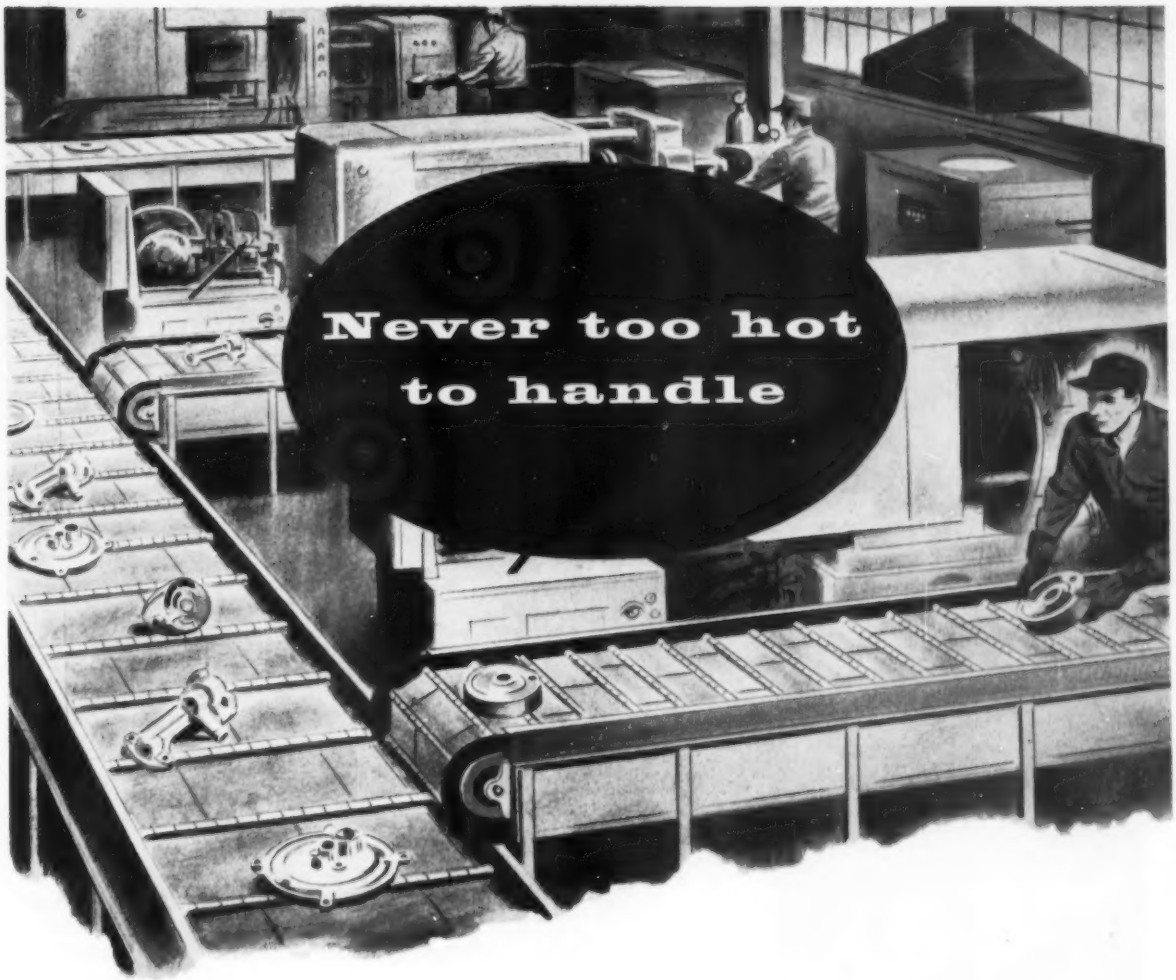
If you can let know of anybody you know of who will not turn up their nose and snort if you only want a couple, please advise.—P.D.G. (Design Engineer.

We have forwarded a copy of an article on this subject, "Prototype Die Castings Produced by Investment Casting for Preliminary Testing and Study." This article appeared in PMM, April 1952, pg. 50, and explained not only the advantages of investment cast prototypes, but showed examples and offered information on how models should be planned.

Names of several companies to do this type of work have been forwarded.

It is also interesting to note that plaster mold casting has been used successfully for

continued on page 6



MAY-FRAN HINGED-STEEL BELT IS DESIGNED TO HANDLE HOT, HEAVY AND ABRASIVE PRODUCTION DIE CASTINGS

Keep parts moving! MAY-FRAN hinged-steel belting is built to withstand excessive punishment from hot, heavy or abrasive parts. Hinged-steel belt conveyors are designed for maintenance-free high production throughout the life of the machine served.

Precision formed from heavy gauge steel, MAY-FRAN hinged links are assembled by means of high carbon steel rods . . . side chains become an integral part of belt. Outside links incorporate interlocking wings which remain positively engaged at all times and keep parts on belt.

Component parts of MAY-FRAN hinged-steel belting are stocked in a wide range of sizes. Complete steel belting can be economically assembled in minimum time to fit your present conveyor system or meet specific applications. Ranging in width from 6-inches to 6-feet, belting can be furnished in any length or carrying capacity with solid or perforated links.

Speed up production . . . reduce maintenance costs in your materials handling system . . . specify MAY-FRAN hinged-steel belting.

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• Savings in Man Hours
with

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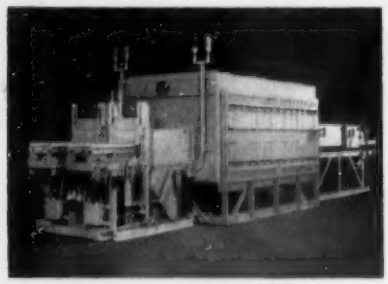
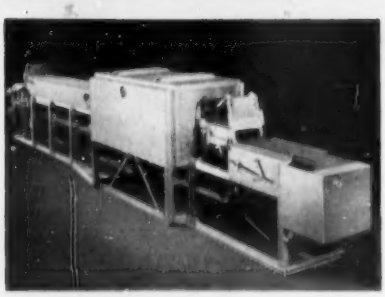


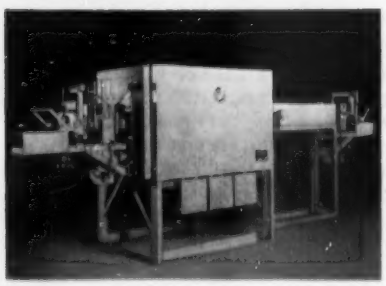
Mechanical or Hydraulic PUSHER TYPE FURNACE—Doubles Production in ½ the space

Twin muffles and pusher mechanisms provide double the production capacity, yet take only ½ the floor space required by two ordinary furnaces. Ideally suited for straight line conveyorized production with consequent savings in man hours. Independently controlled pushers provide a smooth flow of concentrated loads up to 600 pounds an hour on a continuous basis for long heating cycles. Several sizes for sintering and infiltrating.



CONTINUOUS MESH BELT CONVEYOR FURNACE

Continuous, large volume production possible by means of high power input. Alloy mesh belt with simplified take-up and speed-selection drive mechanism gives continuous trouble-free service. The greater production capacity of this furnace means important savings in valuable floor space and man power. Close temperature control assures product uniformity. In sizes to suit a wide variety of sintering requirements.



MANUAL PUSHER TYPE FURNACE

High power input provides high production capacity. This furnace is compact and very efficient, having the same basic features found in Harper mechanical or hydraulic pusher furnaces except that parts are charged and discharged manually. Loading and exit doors are smooth acting, providing good atmosphere retention. Hot zone provided with three zone power adjustments for required temperature uniformity. Several sizes for sintering and infiltrating.

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LETTERS TO THE EDITOR
continued from page 4

making prototypes of die castings. Information on this has also been forwarded. Ed.

NOMENCLATURE

We have been reading the November issue of *Precision Metal Molding* and note with great interest a Letter to the Editor on page four regarding the use of the term "Sinterings".

We heartily agree with the correspondent that "powder metal parts" is not a really suitable term for parts made by powder metallurgy. Primarily, we feel that the word powder is a disadvantage in so much as this is a comparatively new industry and a certain amount of educational work has to be accomplished with design engineers in order to get them conscious of the vast possibilities of our industry. The word "powder" does perhaps denote a certain weakness in the manuactured part and if this word can be completely eliminated and the word "sinterings" substituted it will be better for all concerned.

For several years we have been looking for a good descriptive name for our parts and as soon as we had information that the Americans were seriously considering the use of the term "metal sinterings" we adopted this and now refer to our parts as metal sinterings.

We sincerely hope that you will have many replies to your notes in this strain.—J.R. (Director, England).

ANODIZING HIGH SILICON ALLOY

We are extremely desirous of obtaining information on the dyeing of anodized high silicon castings.

Will you please send us or refer us to source material

continued on page 74

ACME *Engineered*

ALUMINUM & MAGNESIUM CASTINGS

A typical Acme casting for a defense product. Fin sections have a wall thickness of 1/8". Casting 24" wide.

Deep fat fryer casting including rod-type heating elements cast in as a complete unit. Acme has produced hundreds of thousands of these units.

Acme of Chicago offers a *complete engineering service* with over 33 years of engineering and foundry experience back of this service. Better light metal engineering service may mean the difference between success and failure in using light metal castings.

Acme of Chicago also offers a *complete casting service* including aluminum alloy permanent mold and semi-permanent mold castings and aluminum and magnesium alloy sand castings. We are interested in special castings too, including castings with steel inserts and castings with heating elements or tubing cast in as a complete unit. We also offer aluminum and magnesium heat treated and aged castings to meet military specifications.

When you need engineering and casting service for better light metal castings call Acme of Chicago.

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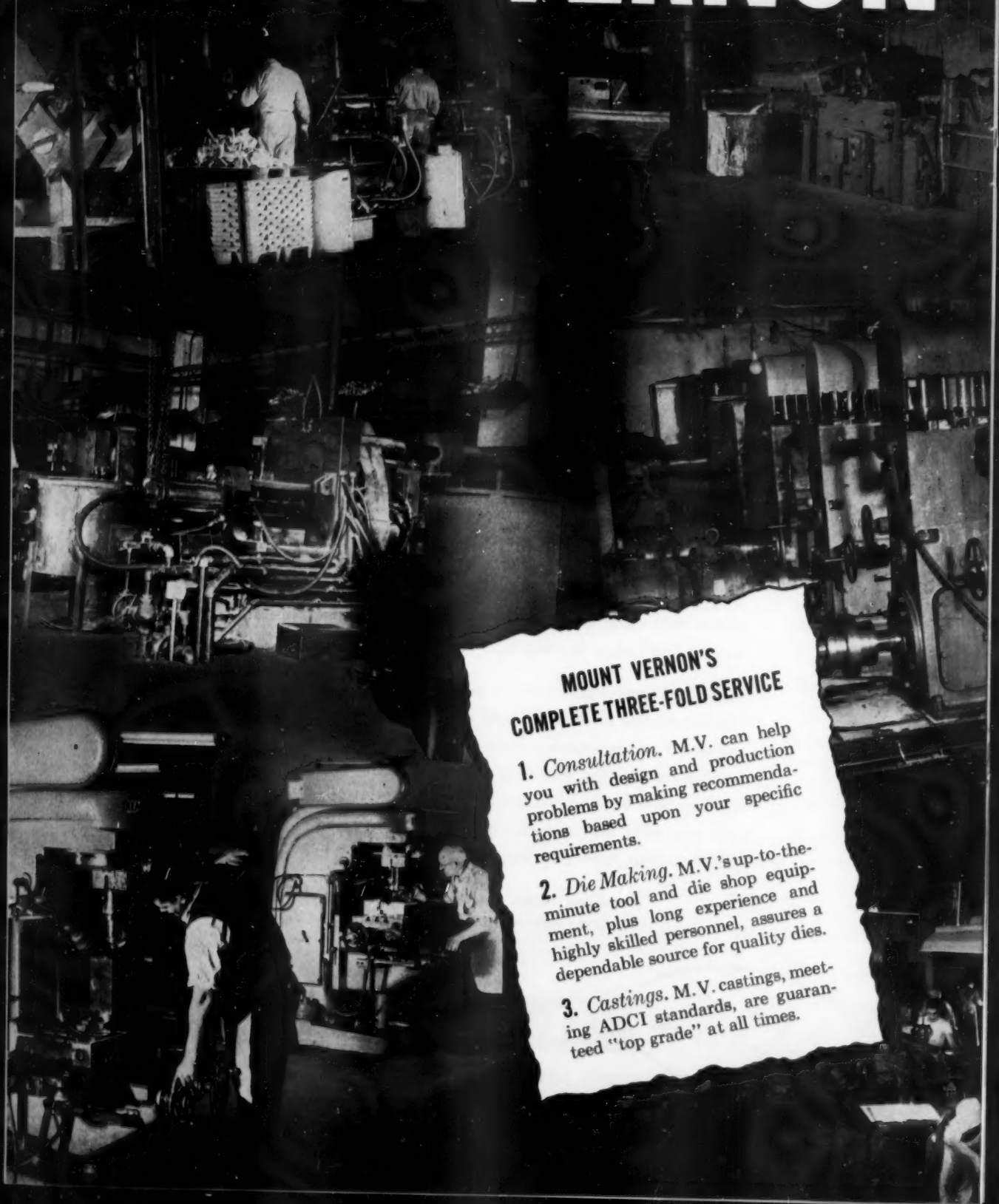

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1. *Consultation.* M.V. can help you with design and production problems by making recommendations based upon your specific requirements.

2. *Die Making.* M.V.'s up-to-the-minute tool and die shop equipment, plus long experience and highly skilled personnel, assures a dependable source for quality dies.

3. *Castings.* M.V. castings, meeting ADCI standards, are guaranteed "top grade" at all times.

an honored name...
in a NEW HOME

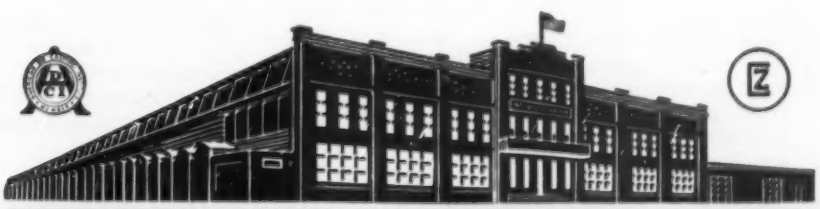
THE MOUNT VERNON DIE CASTING CORPORATION is now located at Stamford, Connecticut.

The reason for our moving is simple. You, our customers, have been so generous in your approval of our work, that we need more space to serve you adequately. We have found it in the spacious all-concrete building you see below, which has 165,000 sq. ft.—double the floor space of our former quarters.

Our new home is a wholly self-contained unit. In it we have ample room for our engineering department; for our complete tool and die shop; for our new, revolutionary zinc set-up; for an advanced design aluminum set-up operating integrally with two automatic electric furnaces, completely separated from the zinc division; for our forty die-casting machines, our finishing division, our modern metal recovery plant, as well as storage space for both dies and metals.

So we are now working in new physical surroundings—but one thing remains unchanged: Our determination, unvarying since 1905, through quality die casting to help *you* build even finer products at ever lowered costs.

Yes, we take pride in our new home—but we shall judge it by the measure of its success in serving you.



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STAMFORD, CONNECTICUT

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Keep the investment casting technique in mind when designing new products or improving old ones. It's the ideal, low-cost way to produce functional parts in their "natural" shapes needed to improve product performance and appearance.

We'll be glad to assist you in planning your own investment casting department or to recommend casting firms equipped to serve your needs. This service will not obligate you in any way.

SEND FOR THE INVESTMENT CASTING STORY

This free 12-page booklet – "MODERN PRECISION INVESTMENT CASTING"– contains informative data on how and where the process can be used.

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WAtkins 4-8880

Between the Lines of this and future issues

An Answer for Back-Breakers . . .

It's not that we're getting soft or lazy, but just using good sense when we cut down the weight of any gadget that has to be carried. For instance, two ways in which aluminum die castings are being used to spare someone's back muscles are reported in articles on pages 40 and 42.

All That Glistens Is Not Chromium . . .

Newcomer to the family of bright finishes that can be used on die castings is vacuum metallizing. Advantage claimed for it is a saving on buffing and polishing. What it is and where it can be used are the subject of an article beginning on page 54. It is not only useful on zinc die castings, but may also be one answer to the problems encountered in chromium plating over aluminum on a production basis.

More Ways to Use Metal Powders . . .

The program of the Metal Powder Association's annual show (See page 84) includes indication of some brand new ways that powder metallurgy is being used, such as the manufacture of sheet metal, deep-drawing blanks, etc. We are also pointing out in this issue what might well become a major use of iron powder . . . the production of sintered iron piston rings. To find out how these compare with cast iron rings, see page 35.

This Is No Cure-All . . .

Neither shell mold casting, or any other single process, is cure-all . . . each has its own place and range of usefulness. However, now that the initial excitement of proclaiming a new process has died down, we are beginning to see production reports on actual case histories of shell mold castings, and find that this process can make some spectacular savings in replacing heavily-machined sand castings. For three examples, see page 44.

Test Your Die Castings Beforehand . . .

You will be interested in the practice followed by a company that has plaster mold castings made up for pilot run and preliminary samples, even though production is planned for die casting. This saves expensive changes in dies, permits adjustment of design details. Read about it on page 49.

Our 48th Year

OF QUALITY PRODUCTION

DIAMOND-J

ALUMINUM ALLOYS

For 48 years William F. Jobbins, one of the oldest and most widely known aluminum smelters in the United States, has been a leading producer of all grades of Primary and Secondary Aluminum Ingot.

In addition Jobbins research department has produced such well known alloys as Almag 35 and 56, and Jobbins Supreme 3-6 and 4-8. The outstanding performance of these alloys in foundry usage is evidence of the experience, research and close manufacturing control which go into all Jobbins alloys for your assurance of top quality castings.

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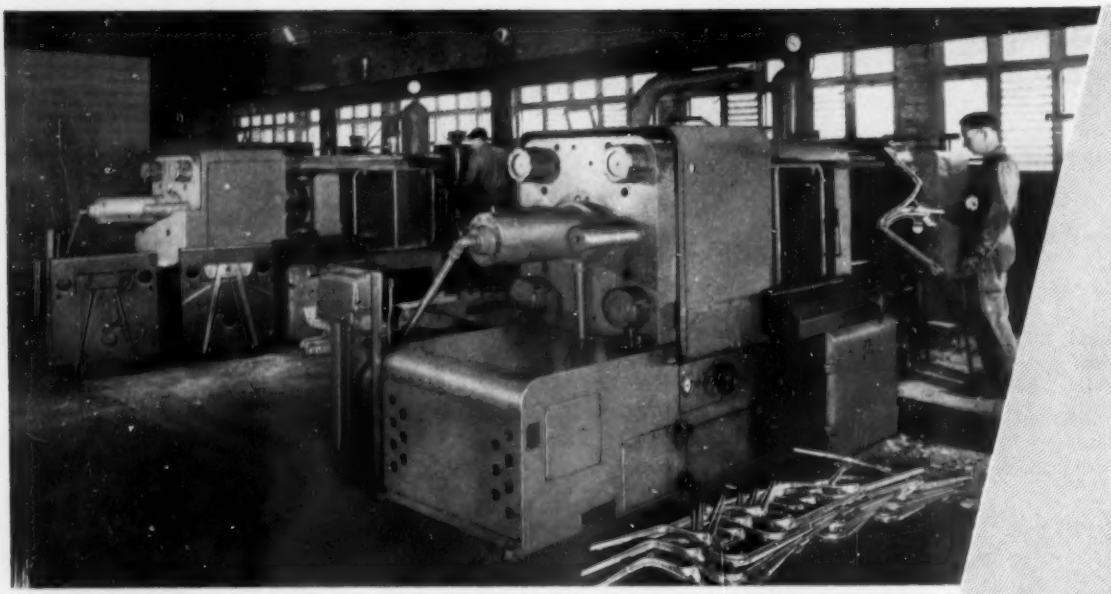

It may seem like kids' stuff to you -

but it requires a high standard of precision die-casting to produce this aluminium furniture

PECO

DIE-CASTING MACHINES

The boys and girls are very much a concern of the State to-day—and notably is this shown in school equipment. Desks and seats are not the cumbrous articles of earlier, Spartan days. Made of aluminum, they're light, bright, strong, comfortable—distributed in thousands by the Educational Supply Association at Stevenage, who utilise Peco Die-Casting Machines in their production. These PECO machines have modernised the technique of cold chamber pressure Die-Casting. They have as a unique feature electrical control covering every movement of the cycle. The four core-pulling connections, hydraulic ejection cylinder and bumper bars for mechanical ejection are fully interlocked, permitting operation in any sequence, and, by use of the hydraulic ejector as a core-puller, the effective die-opening can be increased by as much as six inches.

Illustrated literature will be gladly sent on request

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Here are two of the production stages through which your zinc die castings will pass in their transition from raw material to finished product. Our alloying department has one aim — to exercise the utmost care in the preparation of the alloy to insure on-grade castings. Our complete design and engineering service will assist you to design your product for the Zinc die casting process.

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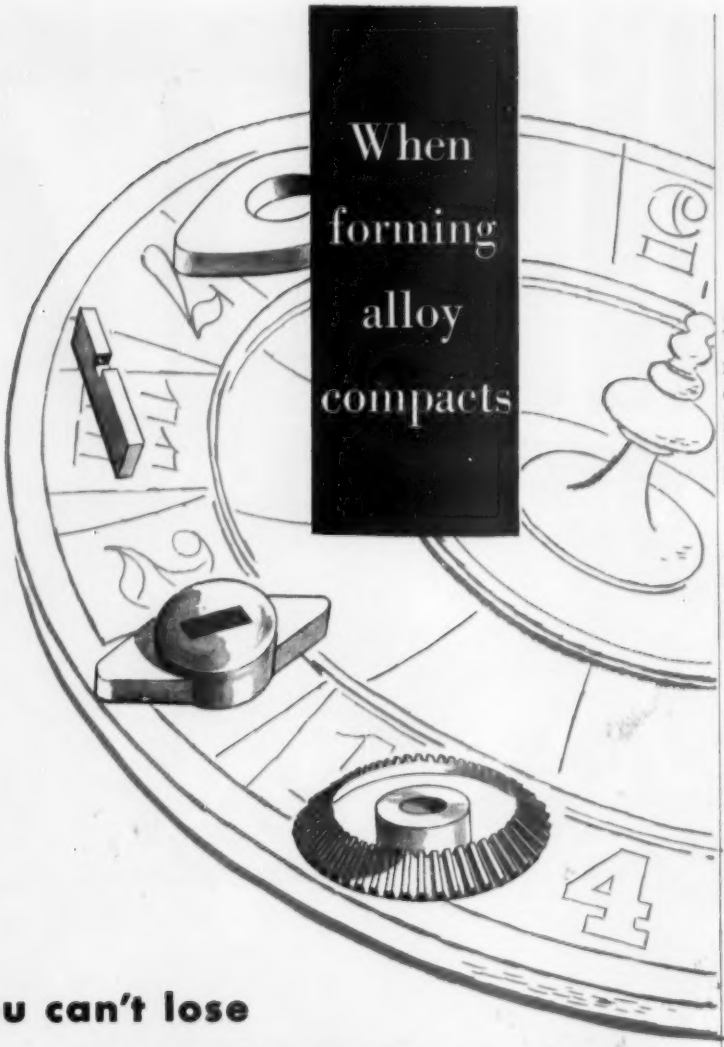

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Your inquiry will bring you complete information about the Hydrimet products without obligation.

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Changes in personnel

Sipi Metals Corp. has announced the appointment of WILLIAM O. BOSSERMAN as managing engineer, anodes div. Announcement of the appointment was recently made by MAURY E. LIPPERT, vice president of the company.

Appointment of DURWARD P. GRAHAM as advertising, sales and promotion manager was announced by *Harper Electric Furnace Corp.*

Two new sales representatives have been appointed by *American Buff Co.* HOWARD A. SIMONS, of Cleveland, will cover the northern Ohio district. ARMAND C. MARAN, of Niles, Ohio, will cover northeastern Ohio, West Virginia and part of Pennsylvania.

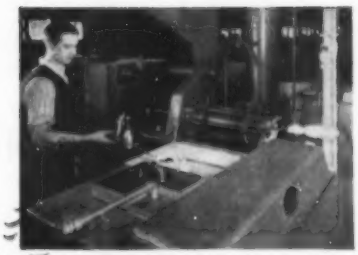
Appointment of GERALD C. WATERMAN, formerly of Rochester, N. Y., as the new regional sales manager for the middle western states, with headquarters in Chicago, was announced by A. H. HARTMAN director of sales for *Consolidated Vacuum Corp.*

LEONARD J. EDWARDS has been appointed vice president in charge of sales for *C. I. Hayes, Inc.*

Two new sales representatives for *Alloy Precision Castings Co.* have been announced by S. E. FLENNER, sales manager. SYDNEY E. GREGORY will represent the company in the Illinois and Indiana territory and GILBERT P. MUIR will cover the western Pennsylvania district.

HERMAN TANN, president of the *Tann Corp.*, announces

continued on page 18



LINDBERG IN England

Manufactured by the Electric Furnace Company, Ltd., these two-chamber Lindberg-Fisher melting furnaces are installed in the Newcastle-under-Lyme works of the British Thomson Houston Co.

This installation is typical of many others throughout the world where Lindberg-Fisher melting furnaces . . . utilizing the famous two-chamber principle . . . are minimizing metal impurities, reducing metal losses, speeding production and cutting costs.

Lindberg-Fisher melting furnaces will solve die casting production problems . . . for details and "case history" information contact your nearest Lindberg-Fisher representative.

LINDBERG-Fisher MELTING FURNACES

LINDBERG ENGINEERING COMPANY,
2463 West Hubbard Street, Chicago 12, Illinois

For additional information Circle No. 18 on the Reader Service Card

Reference Data offered in this month's advertisements

8. DIE CASTING ALLOYS available from Apex Smelting Co. are listed together with their properties in a booklet from the company.

9. DIE CASTING MACHINES, special or standard, are described in the Cast-Master, Inc. catalog.

11. DIE CASTINGS — SMALL OR LARGE can be economically produced by the Dollin Corp. Their brochure describes all of the facilities available.

17. THE ADVANCED DESIGN and outstanding features of Kux Die Casting machines are described in the company catalog.

18. FOR CLEAN SLAG FREE METAL a two chamber melting furnace is recommended by Lindberg Engineering Co. in case history studies.

21. FILE FACTS, Monarch Aluminum's description of their unified production facilities tells about their facilities from drawing to finished part.

30. DRUM SANDERS that use abrasive strips for polishing are described in a bulletin from Carborundum.

31. TUMBLE FINISH BY GRAV-I-FLO, a complete catalog of equipment and supplies for barrel finishing is available from the Grav-I-Flo Corp.

32. REDUCE ASSEMBLY COSTS through the use of self tapping screws. The new Parker-Kalon booklet tells how.

34. PRE-ALLOYED METAL POWDERS. Chromium-nickel pre-alloyed powder when mixed with iron powder gives compacts of superior strength. Full engineering data is available from Metal Hydrides, Inc.

36. BASIC ENGINEERING DESIGN DATA is contained in the Newton-New Haven Co's. book, "Dimensioning Die Castings."

39. HIGH CORROSION RESISTANCE and at low cost can be secured with Iridite. For full data and specifications ask for Allied Research Products Co.'s new data sheets.

41. FINISHING BARRELS AND SUPPLIES as well as finishing services are available from Minnesota Mining & Mfg. Co. Their booklet "Barrel Finishing Manual" gives details.

44. INVESTMENT CASTING ALLOYS tailored for your particular needs are described and standard alloys listed in the Cannon Muskegon brochure.

46. EJECTOR PINS in standard sizes and finishes are listed in the complete catalog of Detroit Mold Eng. Co. Ask for data sheet no. 521.

47. CAVITY RETAINER SETS and ejector boxes precision made by Detroit Mold Engineering Co. will lower die construction costs. Their catalog gives complete specifications.

49. THE HENNING MESSENGER brings you news of the company and its products. A monthly publication by Henning Bros. & Smith, Inc.

51. DESIGN INFORMATION and literature about the company's facilities are available from Litemetal Dicast, Inc.

56. A 44 PAGE BOOKLET giving pointers on the best methods of metal cleaning has been published by Oakite Products, Inc. The latest issue is greatly expanded to discuss 16 new materials.

62. STANDARD SIZES AND SHAPES in bearings and bushings can slice production costs. National Molded Products, Inc. has a listing of available stock sizes to choose from.

68. FOR BETTER INVESTMENT Castings at lower cost use a direct-casting electric furnace. A complete line of equipment is listed and illustrated in information available from Detroit Electric Furnace Div. of Kuhlman Electric Co.

69. CASTING IMPREGNATION with a vacuum pressure unit is described in the bulletin "Mogul Cast Seal Impregnating Process." A copy can be secured from the Metallizing Co. of America.

75. CONTROL OIL TEMPERATURES for steady production on die casting machines. Bulletin 1.1K5 by Kewanee-Ross Corp. gives data and performance characteristics of their heat-exchangers.

79. STAINLESS STEEL LADLES for longer life, greater safety and easier pouring. A catalog of the complete line of these ladles can be secured from Spincraft, Inc.

81. BRIGHT, WEAR RESISTANT Chromuim finishes can be achieved without nickel. Data sheets and engineering information of the Luster-On Zinc-Chrome process can be secured from The Chemical Corp.

82. WHERE DO PERMANENT mold castings fit into your manufacturing picture. An illustrated brochure from Aluminum Permanent Mold Co. will show you.

83. THE ENGINEERING DESIGN and consulting services available from Jersey Plastic & Die Casting Co. are fully described in a free brochure.

86. NON-FLAMMABLE FLUID, (Pydraul F-9) is the subject of an engineering report available from Monsanto Chemical Co.

Here's what 4 EXPERTS say about MERCASTINGS* by ALLOY PRECISION

Manager of Quality Control
A. L. LAMBERT
"Mercastings gave us a better product. Rejection rate much lower than anticipated. Inspection problems were simplified."

Chief Inspector
J. A. GALLAGHER
"Inspection work load was eased which meant work went through faster and saved us man-hours."

Manager of Manufacturing Engineering
F. H. ROHRIG
"In addition to cutting costs drastically, we freed valuable manpower and space for other vital projects."

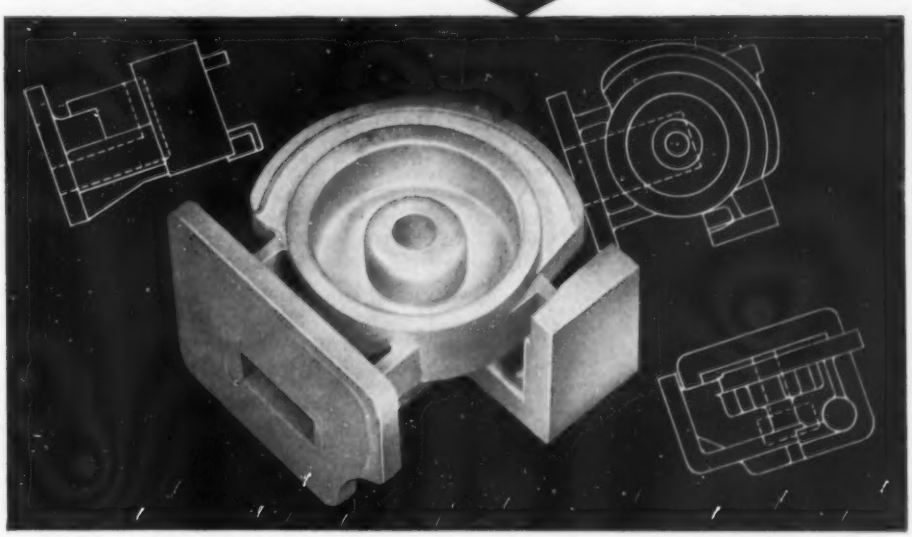
Supervisor of Subcontracting
R. J. LOMMA
"We're sold on mercastings. And when Alloy Precision makes them we know they'll be to specification."

Design of electronic plumbing parts for economical production poses unusual difficulties. This wave guide, for example, if made by traditional methods, would consist of a fabricated unit of over 25 parts. Its assembly would involve machining to extreme tolerances . . . costly precision jigging . . . brazing . . . silver soldering . . . all by skilled craftsmen not available on today's labor market.

Seeking an improved production technique, The W. L. Maxson Corporation engineers decided mercasting—by Alloy Precision—was the only practical solution. Now this part is cast as a single unit in 356-T6—to a tolerance of ±.003 inch/inch. Result is that production is up . . . costs and rejects are down.

This is just one instance of the trend toward mercastings—by Alloy Precision—to slash manufacturing costs. Perhaps it will suggest to you how this versatile metal working process cuts down your production of useless metal chips . . . *increases your production of parts for profit.*

A-8070



* FROZEN MERCURY INVESTMENT CASTINGS

Photos: Courtesy The W. L. Maxson Corporation, Old Forge, Pa.

ALLOY PRECISION *Castings Company*

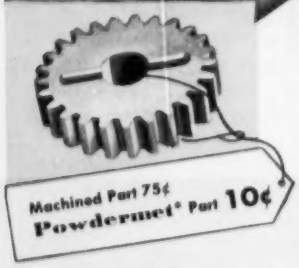
DEPT. G-6
EAST 45th ST. AND HAMILTON AVE. • CLEVELAND 14, OHIO

For additional information Circle No. 2 on the Reader Service Card

DON'T CUT PARTS ...Cut Costs!

Why pour money into expensive machining operations?

POWDERED METAL PARTS can do the job for *much less!*



Tough, intricate parts ready for assembly without further processing—at *savings of up to 600% over identical machined parts!* No wonder industry chooses Powdermet.*

Low-cost PM parts are die-pressed to close tolerances, have excellent wearability, and a wide range of alloys are available—many exceeding the tensile strengths of mild steel. Through controlled porosity and electrical permeability, many special properties are achieved . . . such as oil-impregnation for life-time self-lubrication. That's why Powdermet* parts are often the *best parts possible* for gears, bearings, filters, etc.

At Yale & Towne, years of experience and technological know-how in powder metallurgy back up every recommendation on PM parts for *your* particular application.

The world's most famous key
. . . symbol of industrial leadership!

YALE & TOWNE
MANUFACTURING COMPANY
PMP *Powdered Metal Products Division*
9335 Belmont Avenue • Franklin Park, Illinois

Send Today for Booklet, "Powdered Metal"

*TRADE-MARK

The Yale & Towne Manufacturing Co.
Powdered Metal Products Division
9335 West Belmont Ave.
Franklin Park, Illinois

☐ Send Booklet
☐ Send information on PM parts for attached specifications or drawings.
☐ Have a Yale & Towne Powdered Metal engineer call on me

Name.....Title.....
Company.....
Address.....

For additional information Circle No. 37 on the Reader Service Card

PERSONNEL CHANGES
continued from page 14

the appointment of OTIS L. JOHNSON as sales manager of the Congress Drives Div. His sales activities will be directed to users of V-belt drives and die castings.

Baldwin - Lima - Hamilton Corp. announces the appointment of JOHN J. LITTLEY as assistant sales manager of the Hydraulic Press & Power Tool Dept.

The appointment of PAUL R. PARISEAU as assistant to the president on special assignments was announced recently by S. G. THORNBURGH, president to *Turco Products, Inc.*

Appointment of KERMIT D. COLLOM and STANLEY E. JACKE to the staff of the new Ultrasonics Div. of the *Detrex Corp.* has been announced by WILLIAM F. NEWBERRY, director of sales.

BART C. DICKEY has been appointed development engineer in the production department of *Acheson Colloids Co.*

K. S. TOWE, president, *American Cyanamid Co.* has announced the appointment of KENNETH H. KLIPSTEIN as general manager of the newly created research div. of the company.

Two new appointments have been announced by *Lindberg Steel Treating Co.* MUHAMMAD ABDUR RASHID has joined the metallurgical staff and CARL MEINHARD the research department.

The appointment of J. D. McPHERSON as assistant manager of the manufacturers chemicals dept of the Indus-

continued on page 22

DOLLIN Zinc & Aluminum DIE-CASTINGS

To cut piece costs . . . improve quality . reduce machining and assembly operations—check with Dollin. Many leading manufacturers have found that we can provide the highest quality die-castings at the lowest cost. Reason: 23 years of *specialized* experience . . . plus *specialized* equipment, much of it Dollin-designed:

LARGE CASTINGS—Aluminum castings made on large cold chamber type, high pressure machines. Large zinc castings made on large plunger type machines.

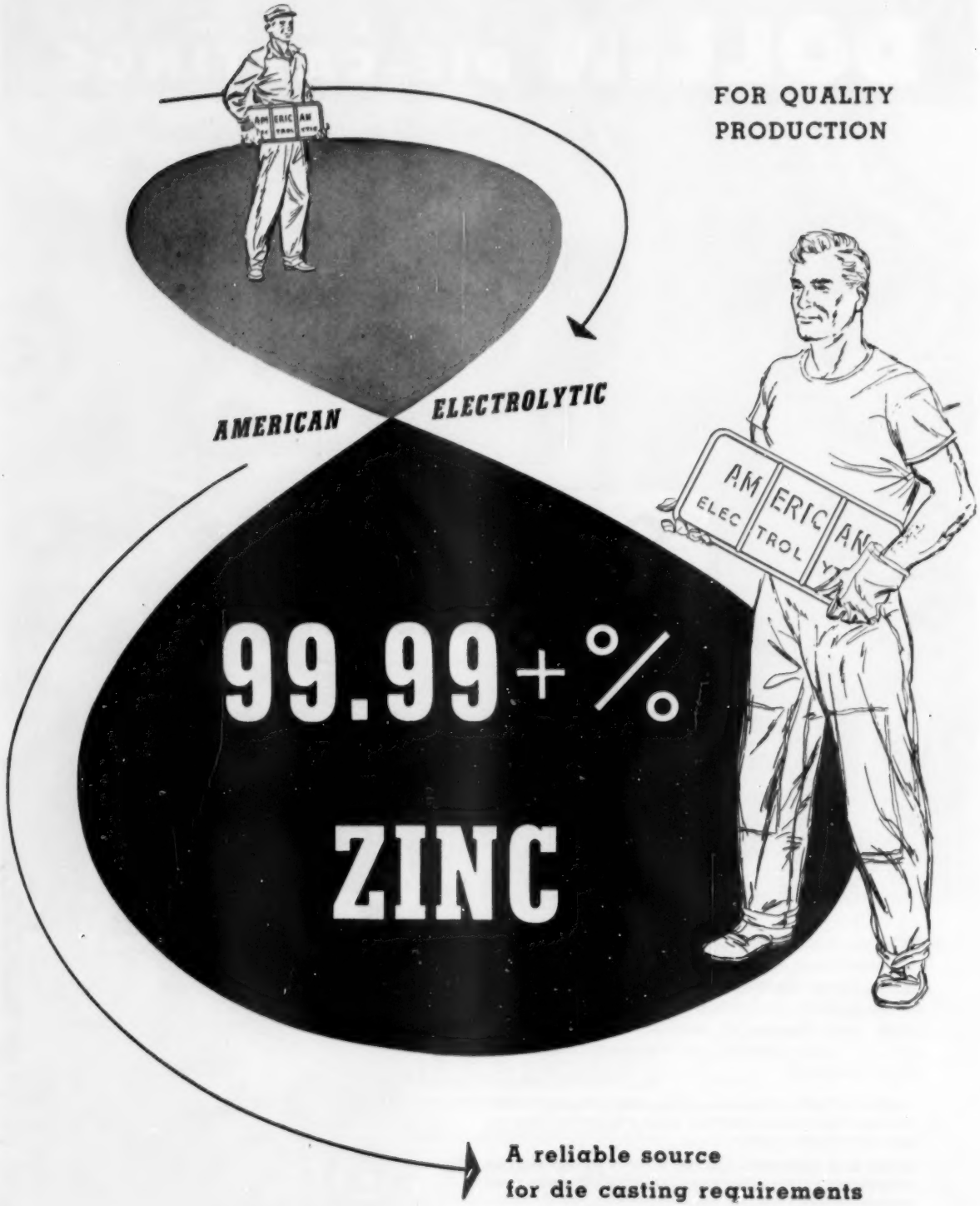
SMALL ZINC CASTINGS—1000 per lb. to 3 per lb.—made on *fully-automatic* machines. More design latitude than other high-speed methods—attractive tool costs and piece prices.

SEND PRINTS OR SAMPLES FOR QUOTATION—engineering advice at no obligation. General Facilities and Small Parts bulletins on request.

DOLLIN CORPORATION, 614 So. 21st Street Irvington 11, N. J.

Sales Offices: Boston • Buffalo • Canton • Charlotte • Chicago
Detroit • Philadelphia • Pittsburgh • St. Louis • Chicago • St. Paul

For additional information Circle No. 11 on the Reader Service Card



AMERICAN ZINC SALES COMPANY

Distributors for

American Zinc, Lead & Smelting Company

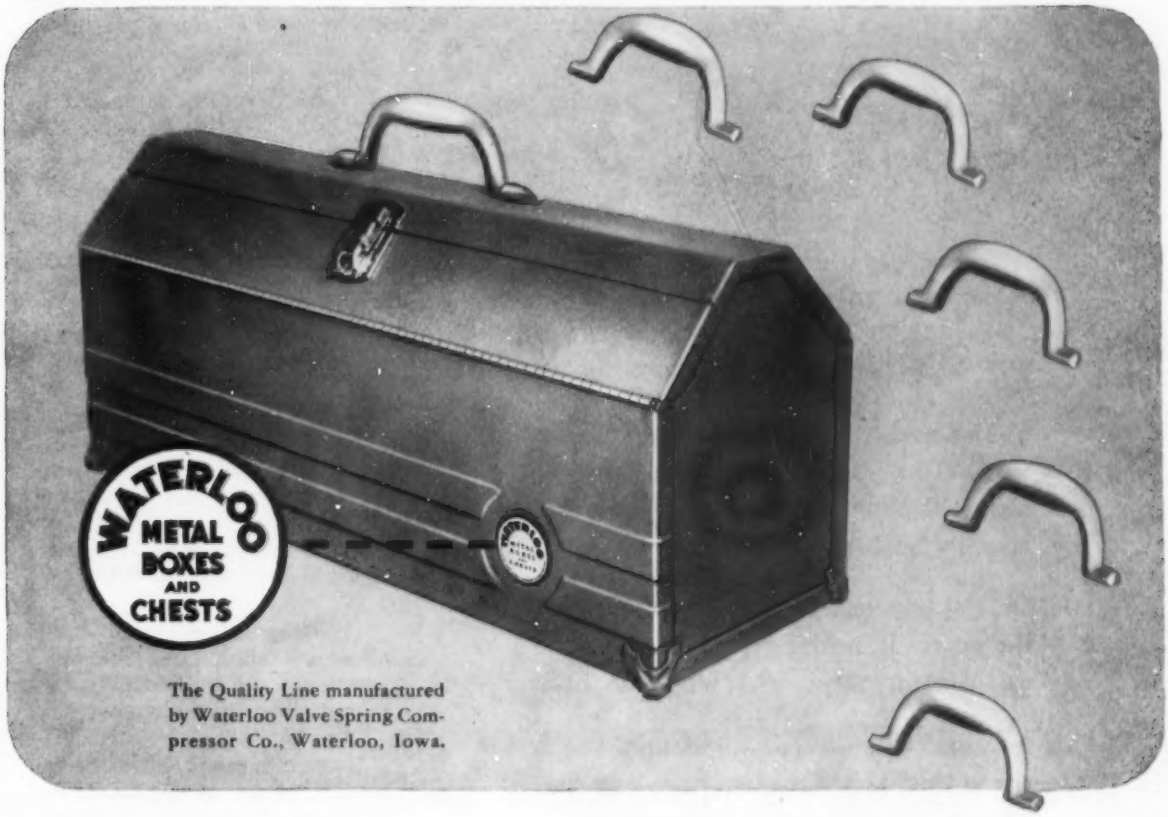
Columbus, Ohio • Chicago • St. Louis • New York

For additional information Circle No. 7 on the Reader Service Card

THE MAGIC TOUCH

that increases sales with

MADISON-KIPP Zinc and Aluminum Die Castings!



The Quality Line manufactured by Waterloo Valve Spring Compressor Co., Waterloo, Iowa.

Designers of products for the mass market constantly look for the magic touch that finalizes a sale quickly.

The die cast and decorative tool box handle is a good illustration of combining value and sales appeal. It has high rating with mechanics who quickly see and feel the difference.

Perhaps there should be more die castings in your product. If you want additional information, please send your blueprints to our home office in Madison, Wisconsin.

kipp

MADISON-KIPP CORPORATION

213 WAUBESA STREET, MADISON 10, WISCONSIN, U.S.A.

• Skilled in Die Casting Mechanics • Experienced in Lubrication Engineering • Originators of Really High Speed Air Tools

For additional information Circle No. 19 on the Reader Service Card

DEPENDABLE
BETTER METHODS
SUPER CAST
DIE CASTINGS
BETTER DIE CASTINGS
SINCE 1919

The meaning of a signature!

Through a quarter of a century of knowing how, the SUPER CAST reputation for Better Methods — Better Die Castings, has been recognized.

Sound engineering, metallurgical knowledge and skilled techniques have achieved and maintained a standard of superior quality.

SUPER CAST has kept faith, always deserving the mark it bears. SUPER CAST means die castings for those who want the best.

A sound, time-tested institution and a sound time-tested product have won confidence and widespread endorsement.

DEPENDABLE
BETTER METHODS
SUPER CAST
DIE CASTINGS
BETTER DIE CASTINGS
SINCE 1919

THE SUPERIOR DIE CASTING COMPANY

1001 London Road CLEVELAND 10, OHIO

For additional information Circle No. 38 on the Reader Service Card

PERSONNEL CHANGES
continued from page 18

trial Chemicals Div. of *American Cyanamid Co.* has been announced.

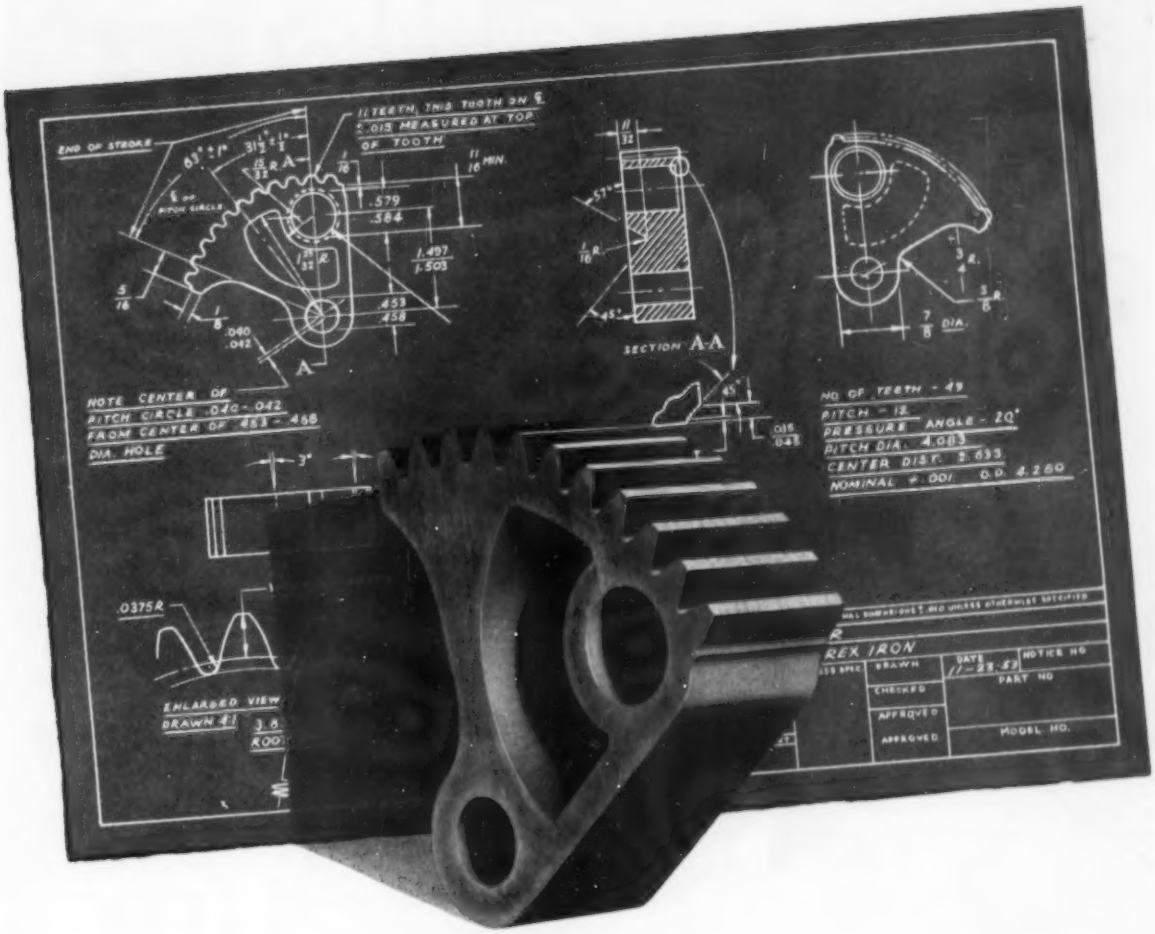
The *New Jersey Zinc Sales Co.* announces the appointment of G. F. A. STUTZ as manager of technical service, succeeding BRUSE R. SILVER, who becomes technical assistant to the vice president.

PHILIP C. MUCCILLI, *National Lead Co.* production manager, has been appointed chairman of the company manufacturing committee. JOHN F. HARPER has been named a member of the committee.

THOMAS A. JOHNSON, a division field engineer in northern Ohio since 1952, has been appointed supervisor of sales for the abrasives division of *Elgin National Watch Co.*

The *Magnesium Co. of America* has announced the appointment of GEORGE O. BOHRER as chief engineer.

Six promotions have been announced by W. J. CLUFF, president of *Frederic B. Stevens, Inc.* FRANK WATT is now general sales manager for the metal finishing and foundry divisions. GUY CUMMINGS succeeds Watt as sales manager for the metal finishing division. CLAIR CRAWFORD is now sales manager for the foundry division. RALPH L. EASTMAN is the new consultant on all metal finishing operations. DURWOOD J. SWANINGER has been made sales manager of buffing compositions and Dr. J. A. RIDDERHOF becomes manufacturing manager and director of research for foundry facing and buffing compositions.



COMPLEX PARTS ARE A CINCH FOR MORAINE POWDER METALLURGY

By conventional casting and machining methods, this part would be high in cost and would require extensive equipment investment. Through the use of metal powder techniques, it has been mass-produced with important over-all savings.

Note the construction details on the print in the background. Formerly many machining processes were necessary before this part was ready to be assembled into a complete, operating mechanism. Now it comes from a press complete in a single operation . . . another example of what can be accomplished through cooperative effort between customer and Moraine.

Moraine's experience with metal powder is contributing widely to modern industry. Many complex designs are resolved into practical, economical production jobs that improve performance and lower costs.

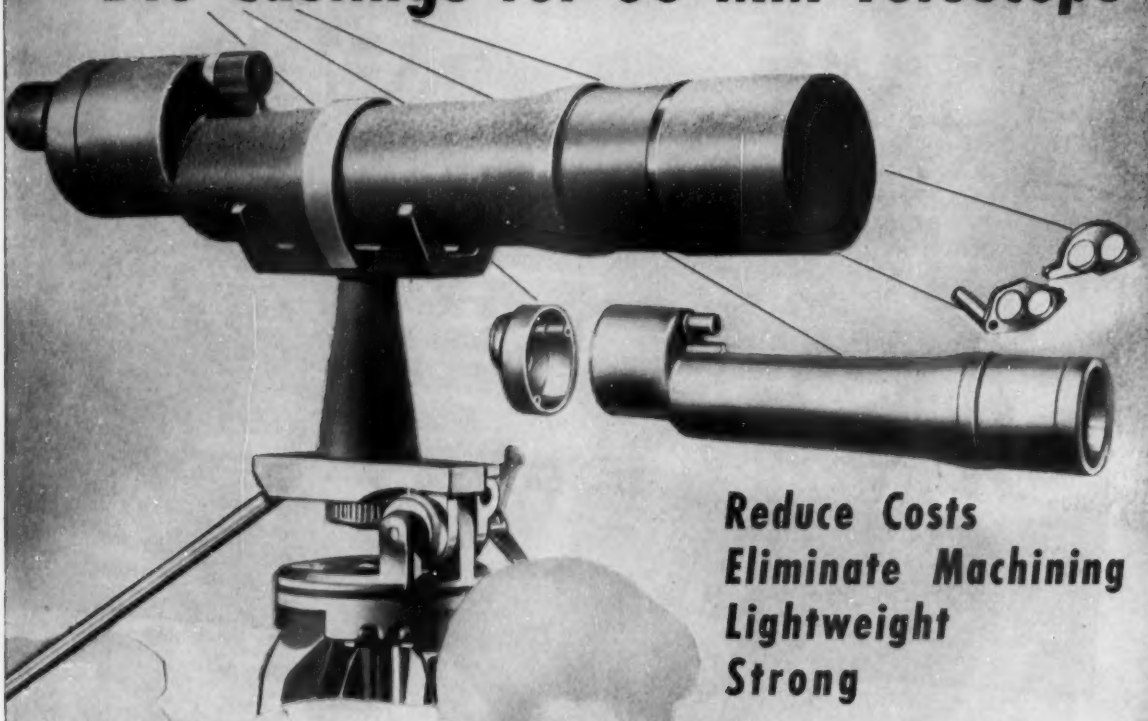
m

moraine products

DIVISION OF GENERAL MOTORS CORPORATION, DAYTON, OHIO

METAL POWDER PARTS

BAUSCH & LOMB selects PARKER Die Castings for 60 MM Telescope



Reduce Costs
Eliminate Machining
Lightweight
Strong

Bausch & Lomb, now celebrating its 100th anniversary, selects Parker as source for quality die castings. The product illustrated is the Bausch & Lomb BALscope Sr. 60 MM spotting scope in wide use as a shooter's spotting scope or, when mounted on a tripod, a telescope for astronomy, sports or bird watching. Parker Die Castings, component parts of this high precision scope, serve to reduce costs by elimination of machining operations. The parts are produced to rigid specifications . . . lightweight and strong.

Consult with Parker on your next die casting requirements. Your action will be mutually profitable.

and when you think of Die Castings
THINK OF

Parker White-Metal Company • 2153 McKinley Ave., Erie, Pa.

PARKER ALUMINUM *and* ZINC *Die Castings*

Names and Trends in Markets · Materials · Applications

WHAT would you guess to be the fastest growing use of aluminum? You're right . . . die castings. Figures just released by The Aluminum Association show a rise of 38 percent in shipments of aluminum for die castings in 1953, based on statistics for the first ten months compiled by the U. S. Bureau of Census and adjusted for trends in the final months of 1953.

CLOSE SECOND in growth are permanent mold castings, climbing 35 percent. These figures contrast with aluminum sand castings, shipments of which were up only 9 percent. **At the present time, die castings and permanent mold castings represent 66.6 percent of all aluminum castings shipped.**

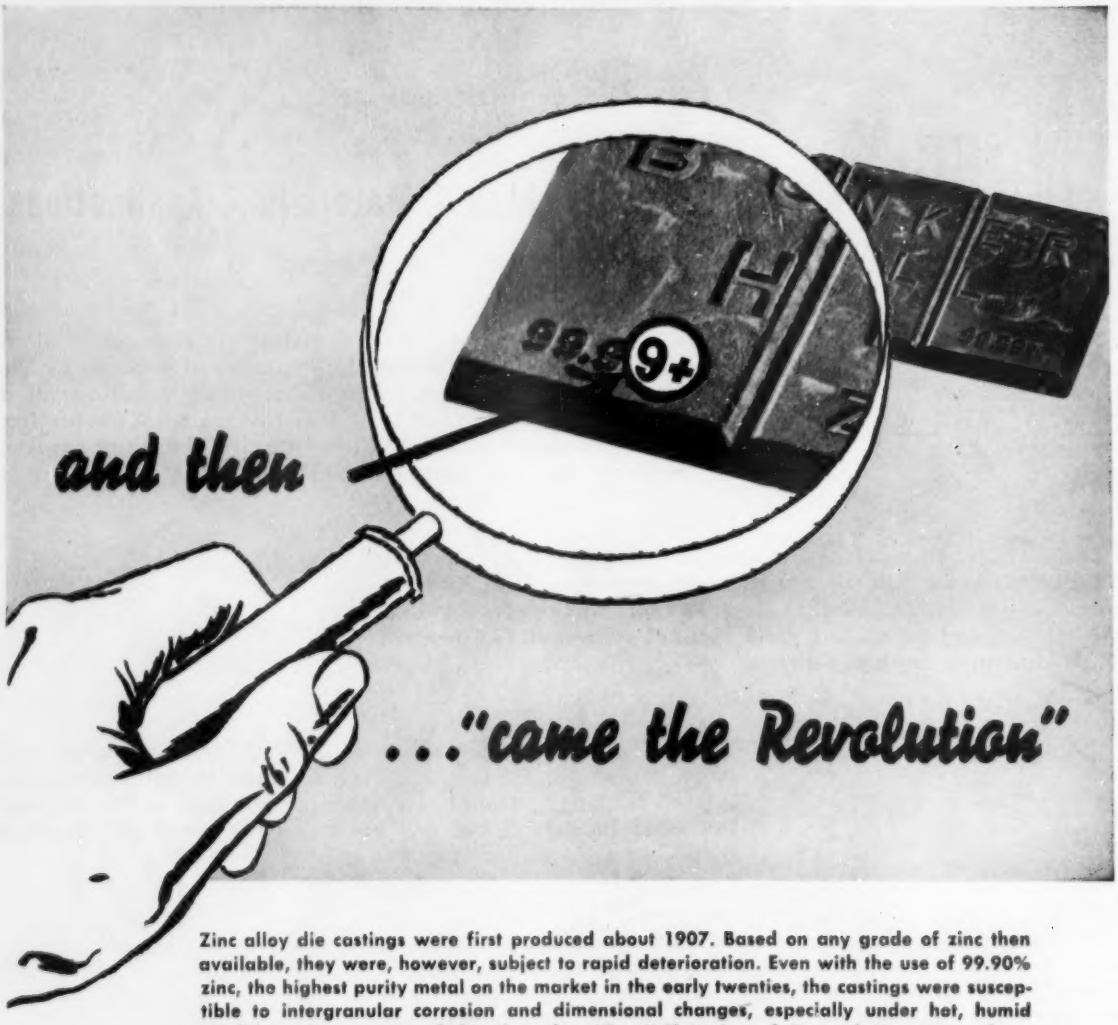
ABILITY OF COMMERCIAL die casters to produce larger and larger aluminum die castings, such as those in automatic transmission housings, accounts for an important part of the increase. Improved finishes, lower unit costs and the premium placed on lightness have also been factors.

RAPID COMEBACK after a fire is reported by Adept Castings, Inc., of Freeport, L. I. On December 2, one of the company's hydraulically operated die casting machines broke a piston and pumped oil to the ceiling. Vapors caught fire and burned the plant to the ground. Fortunately, nine men constituting the second shift escaped unharmed.

WITHIN TWO WEEKS, the company had set up eight die casting machines at a new address and had transported $150,000 worth of customers' dies, none of which was harmed. The machines were extensively damaged, but were repaired and back in service within two weeks.

BOOKS ON PLATING, some of them rare editions dating back more than 100 years, have long been a hobby of Dr. George Dubpernell, manager of the Waterbury laboratories of United Chromium, Inc. His library on plating is regarded as one of the best private collections in the field, was started in 1920, contains more than 500 books printed in English, German, French, Italian, Spanish, Russian, Dutch, Swedish and Norwegian.

CO-INVENTOR of the chromium plating barrel for economical plating of small parts, Dr. Dubpernell was recently honored in recognition of twenty years service with United Chromium. He is internationally recognized as an authority on electroplating.



Zinc alloy die castings were first produced about 1907. Based on any grade of zinc then available, they were, however, subject to rapid deterioration. Even with the use of 99.90% zinc, the highest purity metal on the market in the early twenties, the castings were susceptible to intergranular corrosion and dimensional changes, especially under hot, humid conditions. It was around this time that "Boss" Kettering of General Motors -- perhaps sensing the possibilities inherent in the die casting process and its potential value to the automotive field -- said to an early die casting experimenter: "Give us *stable* die castings, and you'll have a big market in our industry."

Early tests had indicated that the impurities in the base metal were responsible for the casting's dimensional instability and thus limited their field of application. The chief obstacle to the expansion of the young die casting industry was the fact that a grade of purer zinc was not being produced at that time. This obstacle was overcome in 1928 with the first commercial production of a 99.99+% metal -- BUNKER HILL ZINC -- and, as expected, it revolutionized the die casting industry.

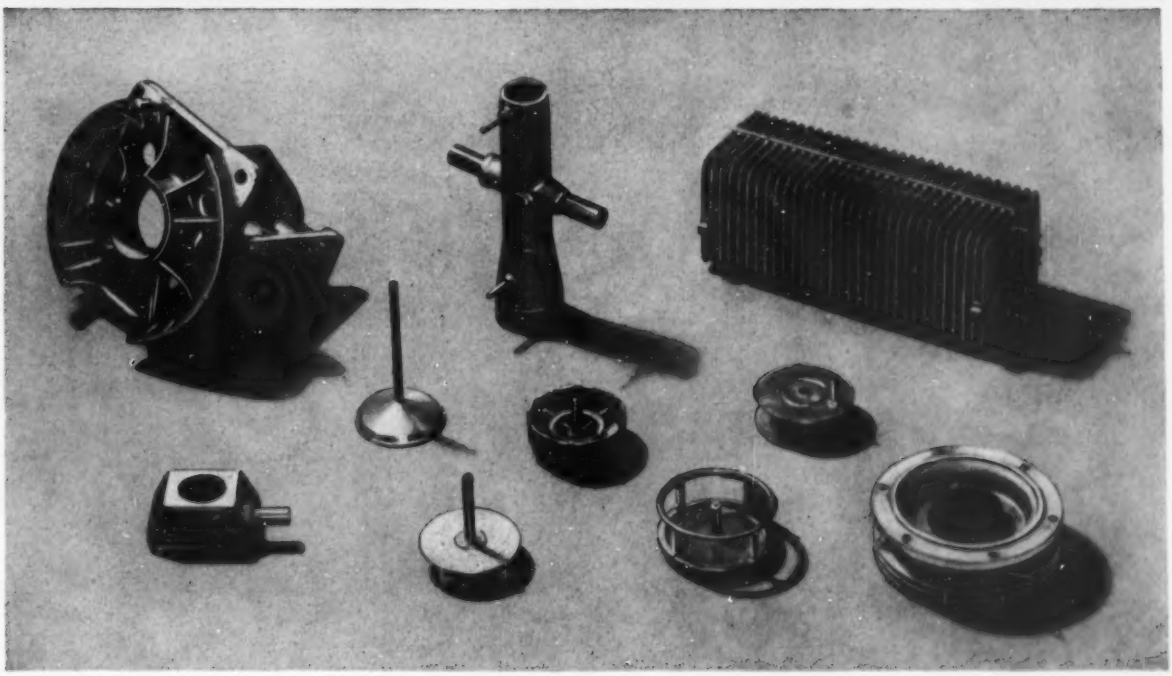
The tonnages of zinc consumed annually by die casters in the early twenties amounted to a few thousand tons, and the application of castings were limited to the automotive and a few other fields. In recent years, the use of zinc alloy die castings has spread into industries too numerous to mention, with consumption averaging nearly 300,000 tons of Special High Grade Zinc annually. Bunker Hill still continues to pioneer in the production and the quality control of the highest purity zinc metal.

EASTERN SALES AGENTS **ST. JOSEPH LEAD COMPANY** 250 PARK AVENUE, NEW YORK 17

BUNKER HILL 99.99+% ZINC

SALES OFFICE FOR PACIFIC COAST **NORTHWEST LEAD COMPANY** SEATTLE, WASHINGTON

No Problem's Too Tough when you call in ... PRECISION



Cast-In Inserts

The use and application of die castings is greatly extended by Precision's ability to produce castings with inserts of any other metal. This makes possible the production of completely integrated parts — functional, electrical, structural, etc. Inserts can be cast in for functional and ornamental purposes.

Shown are some examples of Precision die castings with such inserts as studs, screws, sleeves, and electrical components.

A Precision engineer will be glad to discuss your problems.

Since 1909 the name "PRECISION" has been the symbol of highest quality in the die casting industry.

PRECISION CASTINGS CO., Inc.

212 Walnut St., Fayetteville, N. Y.

Syracuse, N. Y. · Cleveland, O. · Chicago, Ill.

Kalamazoo, Mich. · Cortland, N. Y.

British Affiliation — Wolverhampton Die Casting Co. Wolverhampton, England

For additional information Circle No. 35 on the Reader Service Card

Available From AS&R's Corpus Christi Plant
Most Modern In The Industry

American Smelting and Refining Company
MAIN SALES OFFICE: 120 BROADWAY, NEW YORK 5, NEW YORK

PRODUCERS OF: COPPER • ZINC • LEAD • ANTIMONY • ARSENIC • BISMUTH
GOLD • SILVER • PLATINUM • CADMIUM • INDIUM • TELLURIUM • SELENIUM

For additional information Circle No. 8 on the Reader Service Card

The Finishing Touch . . . *UPF.** . . . with *VELVAGLAZE*

■ From castings to finished components, UPF* offers you a bonus in VELVAGLAZE, one of the complete finishing methods available on Monarch aluminum permanent mold or aluminum die-castings. VELVAGLAZE, a Monarch exclusive finish, imparts a dense, hard surface that stays smooth and resists staining and marring despite years of exposure to usage. VELVAGLAZE cuts finishing costs, either as a final finish, or as a preparatory finish to plating. It provides a low-cost method of adding sales appeal and durability to your product.

*U.P.F.— Monarch's Unified Production Formula gives you undivided responsibility from drawing board to finished castings or assembly.

MONARCH ALUMINUM MFG. CO.
Detroit Avenue at W. 93rd St.
Cleveland 2, Ohio

*Monarch's "Unified Production Formula:"

Better end-products at lower cost

Send Today for Free Velvaglaze Folder

Name _____

Company _____

Address _____

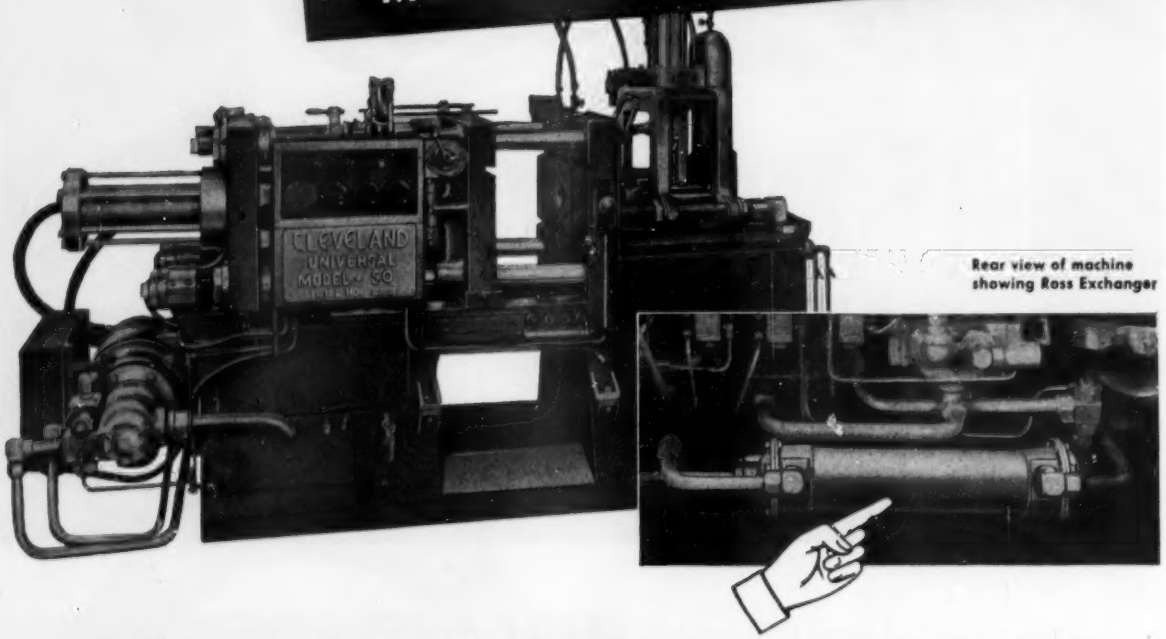
City _____ State _____

ALUMINUM Permanent Mold Castings • ZINC Die Castings • Aluminum Die Castings • MACHINING • FINISHING • ASSEMBLY

For additional information Circle No. 21 on the Reader Service Card

OIL TEMPERATURE REMAINS CONSTANT

while this Cleveland Die Casting Machine cycles 1000 shots per hour



Rear view of machine showing Ross Exchanger

IT'S ROSS EXCHANGER EQUIPPED

With a locking pressure of 50 tons, this Cleveland Model 50 Universal Die Casting Machine has been designed to cycle over 1000 times per hour. To prevent excessive fluctuations in oil temperature, which would tend to cause variations in hydraulic performance, a Ross Type BCF Exchanger has been installed. The full 44.2 gpm capacity of the machine's high pressure, two-stage pump is thus insured!

Says The Cleveland Automatic Machine Company: "Ross Exchangers have done a fine job on Cleveland Die Casting Machines. We have standardized on the Ross Exchanger for our Model 50, because it is compact and we need this space-saving feature especially on this small size machine."

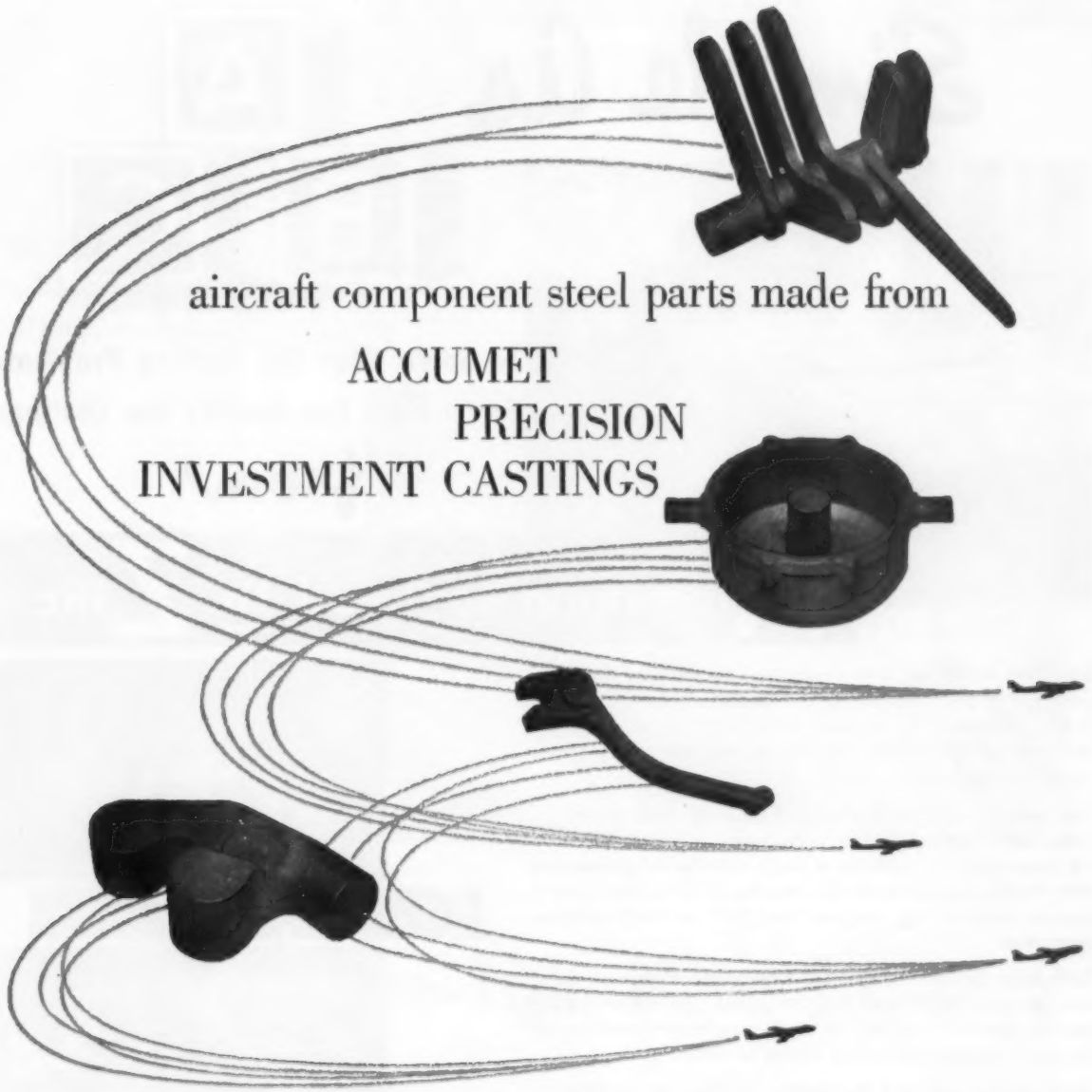
Regularly selected by leading manufacturers of numerous types of major equipment for their high thermal efficiency, Ross Exchangers are ruggedly built to withstand punishing hydraulic shock. Tough, ductile seamless copper shells and brass forgings can well absorb the extra load.

Pre-engineered and fully standardized in a wide range of sizes, Ross Type BCF Exchangers are available with "off-the-shelf" promptness to meet most needs. For detailed information, request Bulletin 1.1K5.

KEWANEE-ROSS CORPORATION
DIVISION OF AMERICAN RADIATOR & STANDARD SANITARY CORPORATION
1446 WEST AVENUE • BUFFALO 13, N. Y.
In Canada: Kewanee-Ross of Canada Limited, Toronto 5, Ont.

Serving home and industry: AMERICAN-STANDARD • AMERICAN BLOWER • CHURCH SEATS & WALL TILE • DETROIT CONTROLS • KEWANEE BOILERS • ROSS EXCHANGERS • SUNBEAM AIR CONDITIONERS

For additional information Circle No. 75 on the Reader Service Card



aircraft component steel parts made from ACCUMET PRECISION INVESTMENT CASTINGS

The pictured castings are currently being used to produce such important aircraft accessories as fuel injectors and regulators, carburetors, landing gear door latch mechanisms, rocket release mechanisms and radar equipment. Cast to close tolerances with smooth surface finish, expensive machining operations are avoided — resulting in saving of valuable time, and reduction in cost. Also *Accumet Precision Investment Castings* permit the use of higher alloyed steels that are difficult or impossible to machine or forge, thus increasing the life or performance of the component parts.

ENGINEERING SERVICE AVAILABLE

Crucible engineers and metallurgists are available to assist you in solving your design or production problems by the application of these Accumet Precision Investment Castings.

CRUCIBLE

54 *years of Fine steelmaking*

first name in special purpose steels

ACCUMET PRECISION CASTINGS

CRUCIBLE STEEL COMPANY OF AMERICA, GENERAL SALES OFFICES, OLIVER BUILDING, PITTSBURGH, PA.

REX HIGH SPEED • TOOL • REZISTAL STAINLESS • ALLOY • MAX-EL • SPECIAL PURPOSE STEELS

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Simple As

To Solve Your Die Casting Problems Fort Offers You Quality Die Castings

from

Aluminum to Lead to Zinc

Specialists at Fort are always ready to help you take the guesswork out of your die casting problems. They are backed up in every detail by a complete, skilled organization in an up-to-the-minute plant with 100,000 square feet of productive space and capacity.

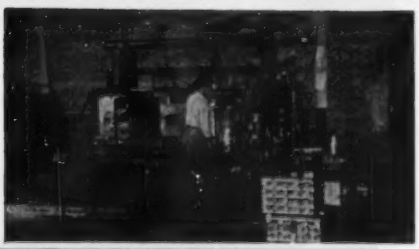
You save on costs directly because Fort designs and makes new labor-saving jigs and fixtures for its unusually complete Machining Department. In addition to large batteries of presses and other machining equipment for reducing finishing time, special purpose machines are designed and built to effect maximum economies.

Fort's large batteries of Zinc Die Casting Machines meet every size requirement. Effective capacity is also maintained for die casting aluminum and lead. In every case, expert metallurgical control is assured for proper choice of alloys.

Fort's modern tool and die making facilities are sufficient to completely tool up for your program and make the dies to conform with your specifications with the highest possible degree of accuracy. Quality is assured in finishing processes such as chemical coatings, plating and painting.

Fort guards its reputation and your product from the very start —engineering good casting design—carefully studying the best types of alloys to be used, expertly deciding on methods that will produce the best low-cost die castings, minimizing machining and finishing—ending with output on a speedy, accurate and economical basis.

No policy at Fort is more important than complete co-operation with the customer.



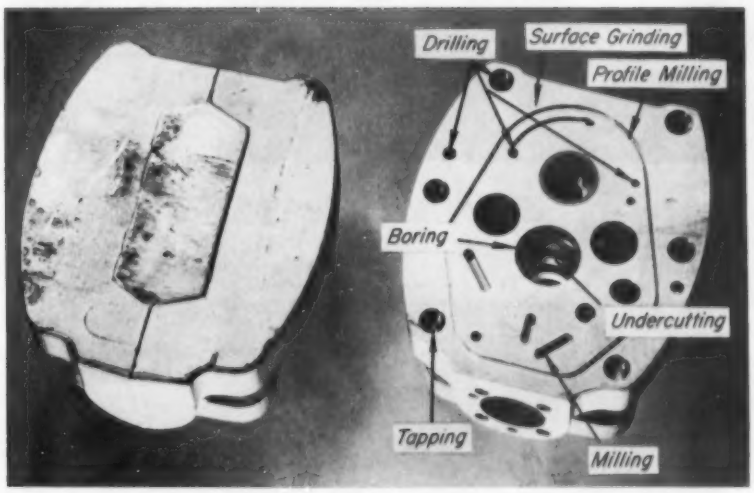
Guard Your Costs! Fortify with Fort!

Cut Costs — Reduce Machining and Finishing Time

FORT DIE CASTING CORP.
MARYSVILLE, MICHIGAN

For additional information Circle No. 12 on the Reader Service Card

Machining that cuts into the heart of these aluminum castings reveals . . .



Dense, Pressure-Tight Metal Structure

ALL aircraft components have one common factor, failure can be and often is disastrous. All aircraft components are built, therefore, with a high factor of safety.

The castings used in the propellor governor built by Woodward Governor Company of Rockford, Ill. are no exception to this generalization. Knowing that some parts of the governor would have to withstand pressures as high as 1200 psi permanent mold castings were chosen instead of sand castings.

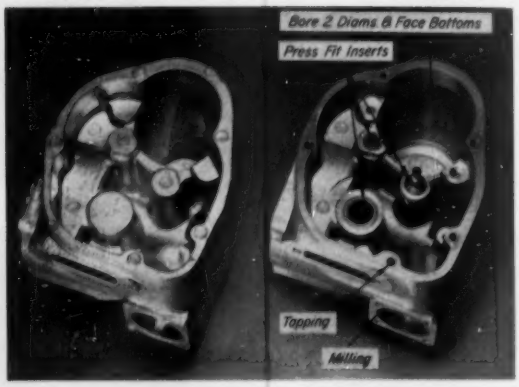
The potential weakness of sand castings lies in the prevalance of inclusions, blow holes and other sub-surface pore-creating factors, plus an inherent large grain size that does not lend itself to the production of sound strong parts.

All of these difficulties are obviated through the use of permanent mold castings. In addition, due to their greater accuracy it is not necessary to allow as much metal for clean up and machining waste. Locating points and surfaces are far more accurate so that fewer and, in some cases, simpler jigs and fixtures are required for subsequent machine operations.

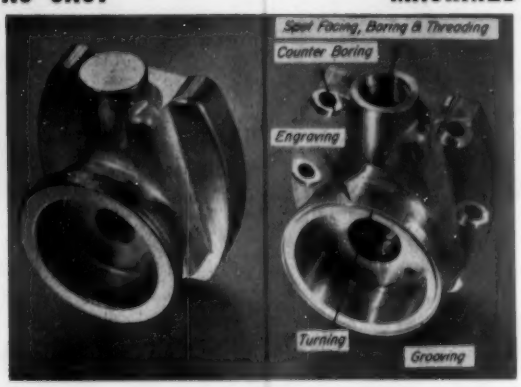
The amount and kind of machining required on these propellor governor castings is unusual. Almost every operation that is performed in a well equipped, versatile machine shop is done on these castings; some of this is indicated in the illustrations.

continued next page

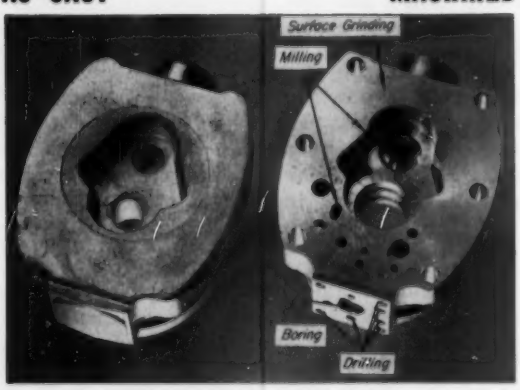
AS CAST MACHINED



AS CAST MACHINED



AS CAST MACHINED



Permanent Mold Castings Are Better than Sand Castings Where Internal Soundness Is Needed . . .

As might be expected on a unit of this sort, all of the machine work is very precise. Since very accurate and complex fixtures and jigs are required it is just as economical to drill most of the holes instead of performing a clean-up operation on a cored hole. For that reason none of the smaller holes are cored, making the casting job simpler, as well as lowering the cost of the initial tooling to a marked extent. Castings are made by the Aluminum Casting & Engineering Co.

Surface finishing is by anodizing after as much of the machining as possible has been completed. Because the inserts would be attacked chemically during the anodizing process, none of the inserts are cast in, but are assembled after anodizing, using a heavy interference fit.

Following the anodizing, the inserts, gear pockets and several valve bores adjacent to studs are finish machined to provide journal surfaces and gear center distances to a high degree of accuracy.

After final machining, exterior surfaces are spray painted with air drying enamel or lacquer. All finished surfaces are protected with spray masks to prevent any paint getting into the finish machined surfaces.

UNRETOUCHED photographs showing as-cast and as-machined castings reveal the sound internal structure of these aluminum permanent mold castings.

These factors → based on the experience of German manufacturers, suggest that it may be practical for us to use . . .

Advantages of Powdered iron piston rings include . . .

ECONOMIC	METALLURGICAL
1. No sawing from blanks.	1. Better lubricating microstructure.
2. Lower metal consumption.	2. Fine, homogeneous graphite dispersion.
3. Suited for automatic processing.	3. Improved chemical resistance.
4. Low reject quota.	4. Mechanical properties or steel.
5. Lower tooling investment.	5. No thermic treatment of hammering.
	6. Can start with full load.

Piston Rings of Iron Powder

BY ALFRED HERMANNS,
Admiral Equipment Corp., Barberton, Ohio.

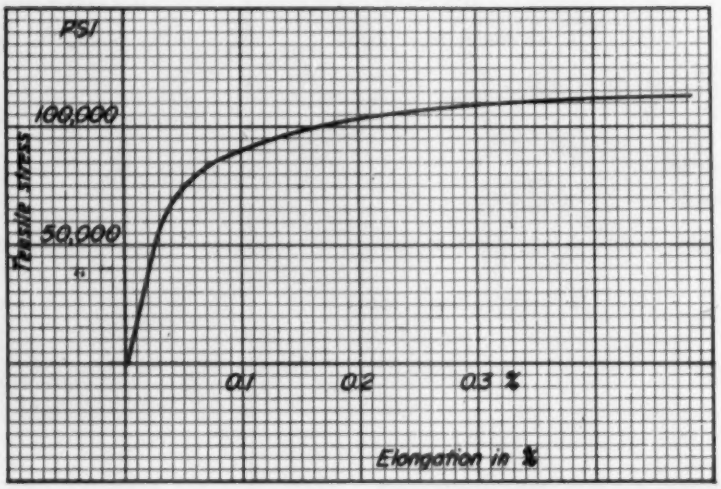
THE standard material for piston rings at the present time is gray cast iron with a sorbitic-pearlitic microstructure. It is intermeshed with a phosphide eutectic pattern, the size of the grains being about 250,000 microns. The material can also incorporate slight portions of ferrite which is securely anchored in the basic structure. Carbon content, in the form of graphite, is 3.3 per cent.

The phosphide eutectic pattern serves as a basic pattern in which the material is embedded. The pearlitic-sorbitic material is less resistant to wear than the phosphide eutectic pattern. This intentionally-created condition serves two purposes: first, it reduces the area of metallic contact during the gliding motion; and second, the area between grains is worn off and produces pockets in which the lubricant is carried during operation and distributed over the area of the cylinder walls.

This characteristic is of utmost importance for the functioning of a piston ring and the better the honeycomb pattern is coordinated with the requirements of the engine, the

continued next page

What Kind of Performance Will Powde



ELONGATION

Elongation of the sintered iron piston ring material is appreciably greater than for the cast iron material at any given tensile strength. Graph shows elongation versus tensile strength of powdered iron piston ring.

PISTON RINGS OF IRON POWDER — continued

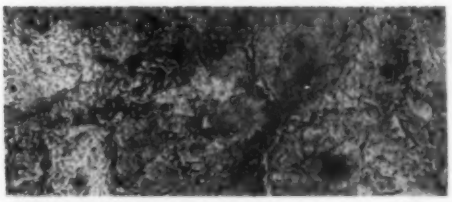
This first report of experience with powdered iron piston rings in Germany contains all the information available, and is offered as an indication of the rapidly widening range of products making use of the unique properties attained by pressing and sintering metal powders.

better the wear characteristics of the piston ring.

Another important component of the piston ring material is carbon in the form of graphite. It is desirable to have a fine and uniform dispersion of carbon within the material, preferably in flake form. The graphite in this application serves as a medium to increase the affinity of the material for lubricants, and as a stand-by for emergency cold starts that lack lubrication. It is obvious how important the uniform dispersion of graphite is. A completely liquid lubrication between piston rings and cylinder wall cannot be attained, at least not during the first period of normal operation. This condition extends far beyond the time element when we consider the setting of rings. An absolute liquid lubrication is desirable, but experience shows that it is not attainable.

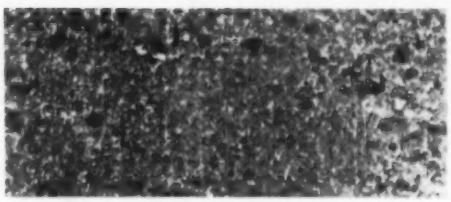
Piston ring and cylinder wall have metallic points of contact during the operation of the engine. Those points are restricted to small areas, and continuously change their location. The imminent danger of damage, resulting from metallic contact, lies in the fact that the surface of the ring is scratched and scuffed. This is especially likely to happen when the piston reverses its stroke. The damaged part must be able to smooth itself out again through its ability to rotate within the groove. If this is not possible, then the pattern for serious trouble is set. The piston ring overcomes such critical cycles by the quality of its material and its design. The ability to move in radial directions, as well as its rotation around its axis, in-

red Iron Piston Rings Deliver?



GRAY IRON

POWDERED IRON



LUBRICATING ABILITY

Non-uniform pattern of graphite distribution, as revealed in microphotograph, above, is characteristic of centrifugally cast piston rings. Compare this with lower microphotograph showing the powdered iron ring with its uniform, finely divided graphite distribution. This is especially important in cold-start lubrication.

sures a constant change of contact and removal of such molecular damage.

The metallurgical qualities must be matched by mechanical properties of the material to enable piston rings to perform under such exacting conditions. Tensile strength and modulus of elasticity are the most important, and development of materials constantly aims at improving these properties.

Analyzing the most desirable features of piston ring materials for modern engines, and what industry has devloped to correct the shortcomings of gray cast iron, it cannot be denied that great headway has been made. However, one would call existing inventions "braces and crutches".

Various chromium plating processes have been developed to help against abrasion; numerous back-up rings have also been tried, but today's piston rings do not have the inherent qualities to meet exacting requirements. If one considers centrifugal casting as the most advanced process for attaining satisfactory results, and also if one recognizes the fact that in spite of such highly developed casting methods the designer must still fall back onto "braces and crutches" in order to get, at best, satisfactory results, then one understands why engineers in the automotive industry have extended their search for new piston ring materials into other areas. Some have concentrated their efforts on powder metallurgy.

Powder metallurgy, in its basic conception, has been known for centuries and modern industry is becoming increasingly aware of its merits. However, the production of articles which require such high precision and uniformity in mechancial properties as piston rings was certainly a forward step. Use of powdered iron piston rings has been investigated in Germany, and at the present time, five manufacturers of internal combustion engines are known to be using this type of ring.

After years of development, this new material has been offered to designers; it is a material which gains its useful properties from its processing as a sintering.

The investigation of sintered iron as a piston ring material was carried out in an orderly manner, based upon some 20 years experience with cast iron materials during which a discernment of the essential properties needed in a piston ring had been developed.

The basic program was as follows:

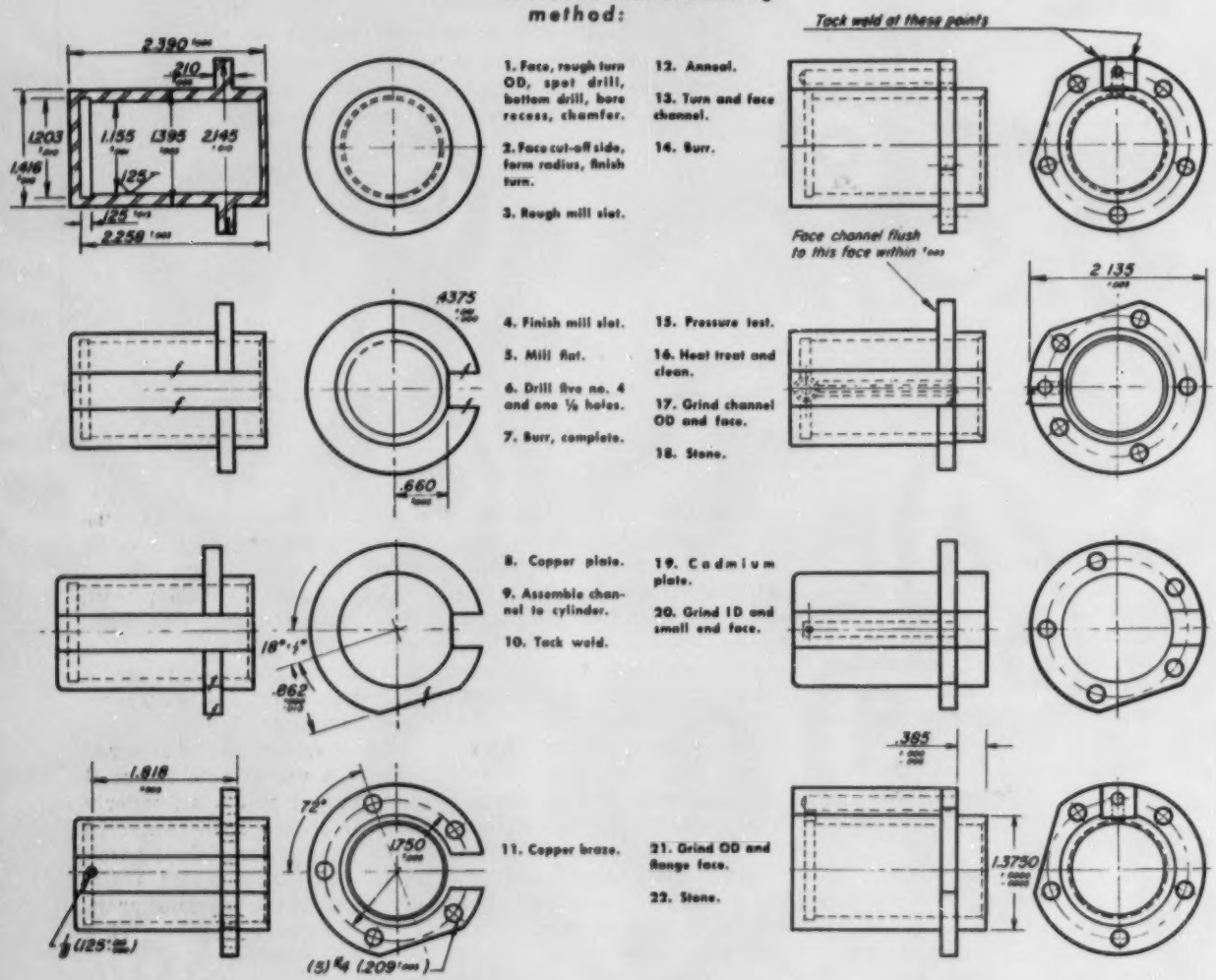
1. Retaining or improving the microstructure of the material; Retaining the phosphide eutectic pattern as most desirable for lubrication purposes;
   Improving the form and dispersion of carbon and increasing the

continued on page 78

BEFORE : *machined assembly*

Previous manufacturing method:

1. Face, rough turn OD, spot drill, bottom drill, bore recess, chamfer.
2. Face cut-off side, form radius, finish turn.
3. Rough mill slot.
4. Finish mill slot.
5. Mill flat.
6. Drill five no. 4 and one ⅛ holes.
7. Burr, complete.
8. Copper plate.
9. Assemble channel to cylinder.
10. Tack weld.
11. Copper braze.
12. Anneal.
13. Turn and face channel.
14. Burr.
15. Pressure test.
16. Heat treat and clean.
17. Grind channel OD and face.
18. Stone.
19. Cadmium plate.
20. Grind ID and small end face.
21. Grind OD and flange face.
22. Stone.



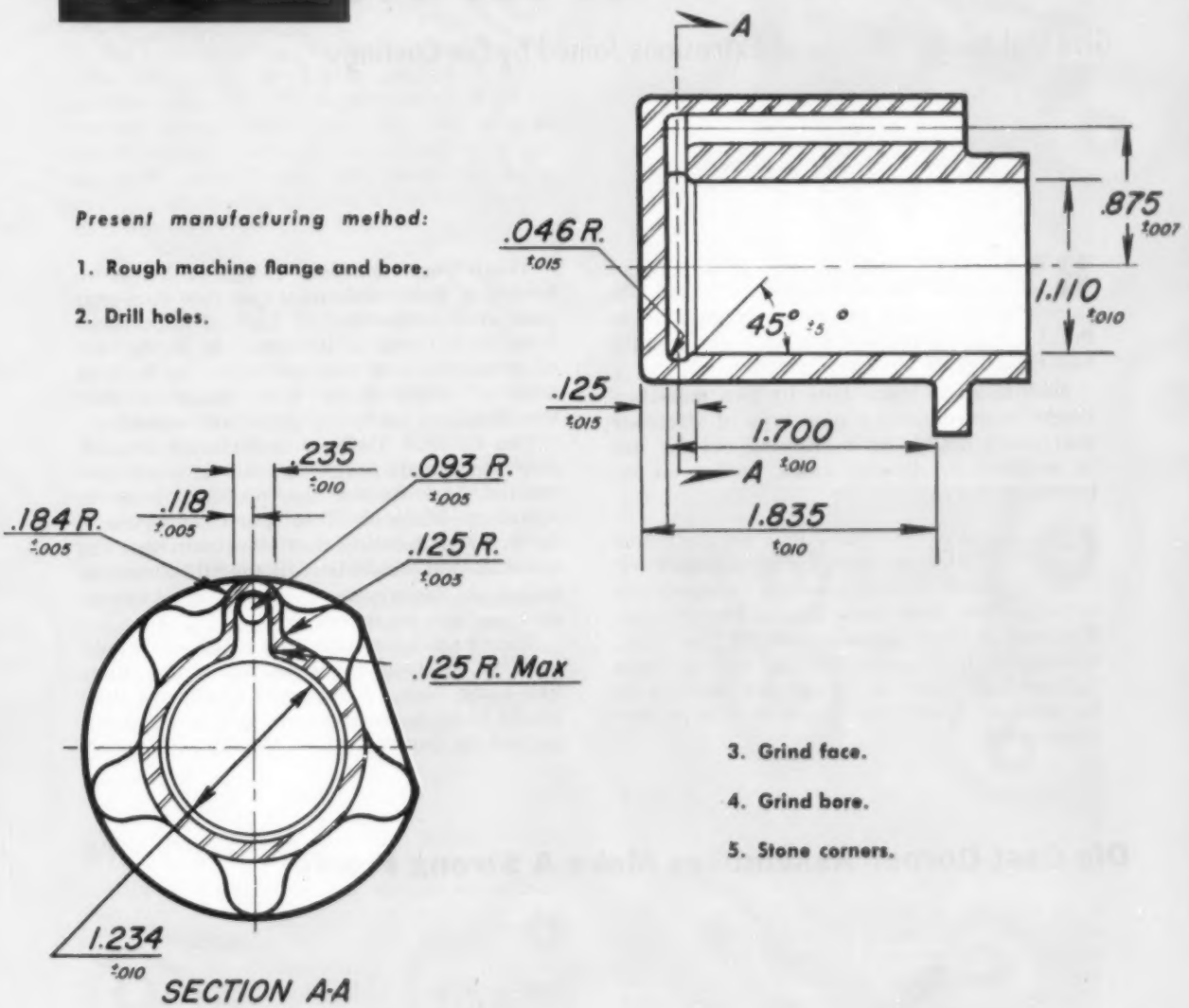
By slicing production steps from 22 to 5, the Sundstrand Machine Tool Co. now gets . . .

Five Cylinder Assemblies For the Price of One

AFTER : *investment casting*

Present manufacturing method:

1. **Rough machine flange and bore.**
2. **Drill holes.**



3. **Grind face.**
4. **Grind bore.**
5. **Stone corners.**

THE substitution of an investment casting for an assembly of two parts, both machined from bar stock, has enabled the Sundstrand Machine Tool Co. to lower production costs on one of their control cylinder housings by 80 percent.

The casting, made by Precision Metalsmiths is in Ni-resist and comes from the foundry as a semi-finished part already X-ray inspected so that pressure testing is no longer necessary. Five machine operations now are required to complete the cylinder housing as contrasted with 22 separate set-ups and over 30 different machine operations formerly needed.

These thirty-odd machine operations, it should be noted, do not include any machining on the separate channel that is attached to the main cylinder body, but do include the assembling of the two parts.

Matched Tolerances For Press Fit

Give Lightweight Frame of Extrusions Joined by Die Castings

BY carefully coordinating tolerances ot aluminum die castings with those obtained on extruded tubing, it is possible to build a frame structure having high strength and rigidity, as well as lightness.

How this has been done by two manufacturers in developing a new type of stretcher that could double as a sleeping cot for use in accident or disaster cases, makes an interesting story.

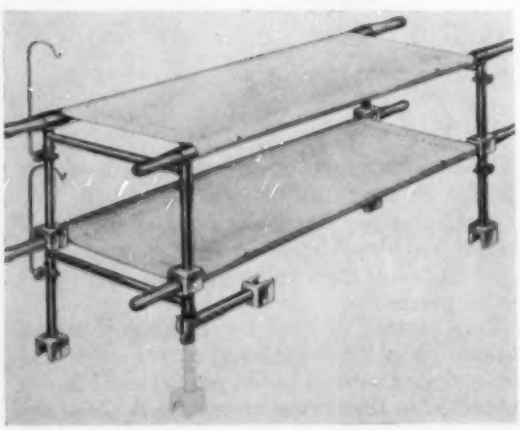
THE DESIGN: The basic idea for the litter-cot came from the New York Civil Defense Commission in cooperation with the New York State Health Department. The men of these agencies thought that time, money and lives could be saved with a single light-weight piece of equipment that could be used as a carrying litter and as a stationary cot.

There were numerous design problems inherent in the development of this dual-purpose unit. Considered of highest importance were such items as lightness, strength, ease of operation and transportation, as well as ease of manufacture with materials that would afford safety, long life and economy.

The Civilian Defense and Health Department men made rough sketches of what they wanted and turned the problem over to Simmons Machine Tool Corp. of Albany, N. Y. After deciding that aluminum was the material that would best fit the bill, Simmons called in Aluminum Company of America development engineers.

In order to save space, the litter-cots would have to be stacked one on top of the other like bunk beds. When used as litters, they would have to be light enough to be easily carried by housewives or teenagers if neces-

Die Cast Corner Assemblies Make A Strong Frame



sary; they would have to be easily transportable in almost any available transportation that might be pressed into duty — light delivery trucks, milk trucks, large heavy-duty trucks, trailers, the conventional ambulance or even railroad freight cars.

As a cot, the unit would have to be comfortable if used for extended periods by a patient; in addition, patients would have to be easily accessable to the attending physi-cian on either the first, second or even higher cots.

The engineers had to keep in mind that the litter-cot would be suitable not only for the sudden mass use that would result from an enemy air-raid on a large city, but also as an emergency time-to-time measure at the scene of highway accidents, mine explosions and similar diasters where a limited number of litter-cots would be needed.

WHY ALUMINUM? In attacking the problem, the engineers decided they would take one point at a time. Since aluminum was both light in weight and strong, two problems were solved in the choice of metal. But could aluminum also have a hinge joint at the knee and locking foot without becoming ungainly? What about strength when you stacked three, four or even more occupied litter-cots? How would you join the sections together economically? How could you make it more comfortable?

It was decided that extruded aluminum sections might work out for the legs, length and width sections, with die castings for the corners and feet. Close tolerances kept in the manufacturing process would permit a press fit for the legs and width sections thereby making for economical and quick assembly.

WHY DIE CASTING? The secret of the litter-cot rests primarily with these die cast corner assemblies and feet and the method of assembly that their design permits.

The corner assembly and feet are made of aluminum casting alloy, Alcoa 380. This alloy was chosen primarily for its strength to withstand great weights when the cots would be stacked and loaded with litter patients. It also offered excellent castability, for the intricate design of the corner assemblies.

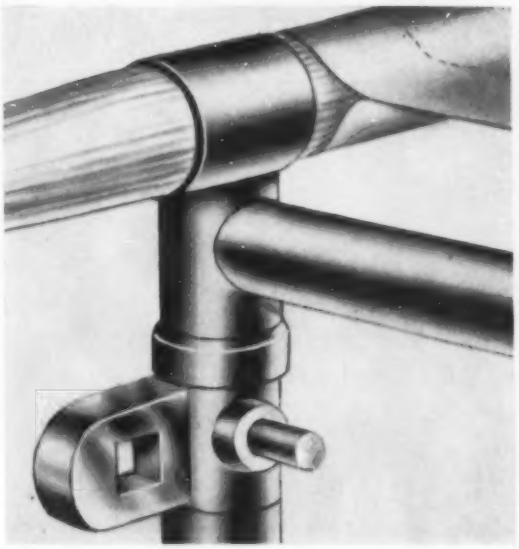
Two male extensions — one extending toward the width of the cot and the other downward for the leg tube — and a hinged joint were incorporated into the corner assembly design.

The length, width and legs were designed of extruded aluminum tube. Alcoa 62S-T6 alloy was chosen for the extruded sections, since it offered the most economically feasible material. The 62S-T6 alloy has a tensile strength of 45,000 psi and a yield strength of 40,000 psi with 17% elongation.

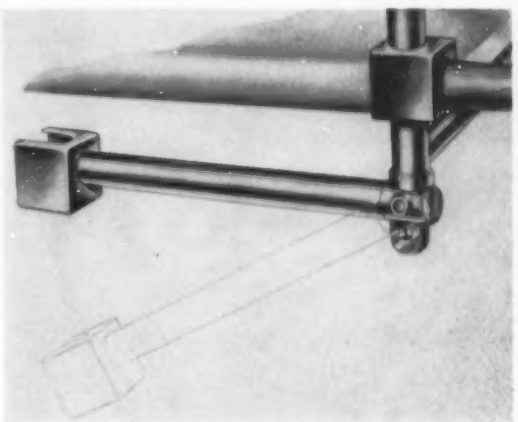
The outside diameter of the extruded tube called for 1½ inches with wall thickness of 0.125. However, it was more important to

continued on page 84

Leg and Knee Assembly

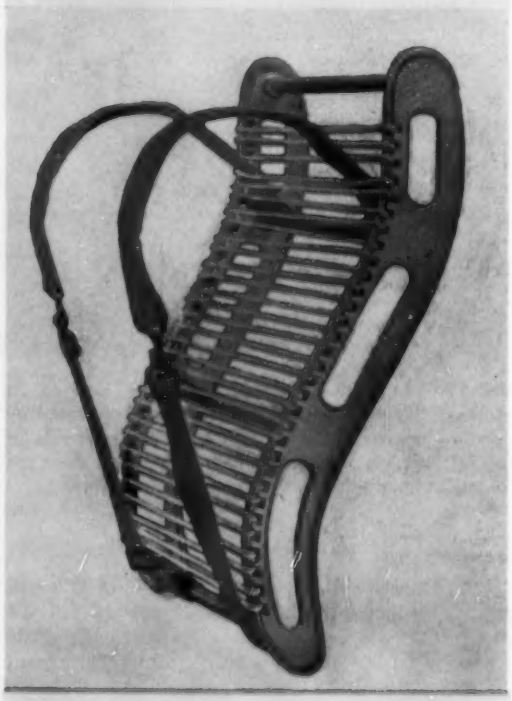


THE LITTER-COT leg in extended position is shown in this drawing. The button shown at the joint is pressed to fold the leg.



THE LEG AND KNEE assembly of the litter-cot is shown in this drawing. The hinged joint is operated by pressing a spring-actuated button on the inner side of the leg. The leg locks either in the extended or in the folded position when the unit is used as a litter.

Carrying is easier because . . .



. . . the frames are die cast

Load-Lifting Can Be Lightened By Design

WHEN his young son was unable to find a pack rack light enough to be carried comfortably on his back, a West Coast die caster decided to do something about it.

He designed and has now put into production a pack rack which promises to fill a need long felt by sportsmen and campers. H. L. (Red) Harvill, has placed on the market the new Harvill Lite and Cool Pack Rack.

Being an old timer in the die casting business, he knew the advantages of aluminum die castings for light, rigid side frames of his pack rack. He has designed the rack frames with a cross section that gives maximum stiffness with minimum weight.

The die castings have been designed to conform to the natural contour of the carrier's back; and instead of using stiff, inflexible materials like wood or pipe between the frames, ordinary venetian blind cord has been laced back and forth. This allows plenty of air to circulate beneath the pack.

By using an adjustable shoulder strap, the pack rack can be made to fit any size person, giving the carrier a feeling of security and freedom of movement.

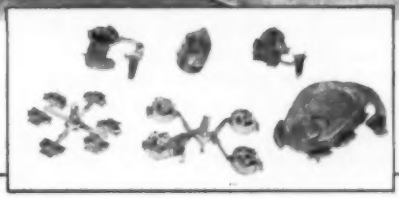
Of course, the same dies can be used to cast magnesium, and if saving in weight or cost favor this metal, conversion would be simple.

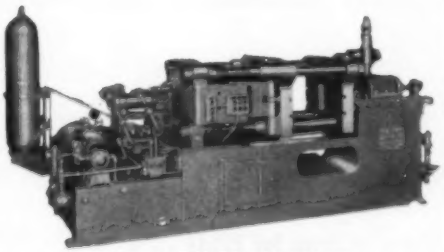
The new pack rack is being made by H. L. Harvill Manufacturing Company in Corona, Cal., and distributed nationally. It has been tested in the field by hunters, skiers and fishermen and has been carried by women and children to make sure it is light enough.

The die casting process has made possible the shape, lightness, and special perforations for lacing the cord. These are all formed during the casting process, saving secondary costs for drilling holes, forming or other processing.

KUX

FIRST NAME IN DIE CASTING MACHINES





MODEL **BH-30** ILLUSTRATED

Hydraulically operated die casting machine for production of zinc castings weighing up to 10 pounds.

USED TO PRODUCE

DORMEYER

FIRST NAME IN MIXERS

Beats • Mixes • Grinds • Stirs
Juices • Whips • Slices • Shreds

...The new Dormeyer Power-Chef performs all! To produce the die cast parts of this famous food-fixer demanded equipment of equal versatility and precision... And KUX • First Name in Die Casting Machines "delivered the goods" to perfection!

Kux improved die casting techniques means improved quality production of YOUR PRODUCT. Let Kux engineering know-how, show you how!

Write for illustrated catalog showing complete line of KUX Die Casting Machines.

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KUX

FIRST NAME IN DIE CASTING MACHINES
SELECTED BY FIRST NAMES IN INDUSTRY

For additional information Circle No. 17 on the Reader Service Card

BIG SAVINGS--

3 Case Histories of Shell Mold Castings

IF puddings are best proved in the eating, castings are best proved in the using. Whatever the claims for any casting method as to theoretical savings in machine time, costs, labor expenditure, etc., the real evidence lies in actual case histories, documented for comparison.

Here, from the files of Builders Iron Foundry, Div. of B-I-F Industries, Inc., are three case histories of shell mold castings.

Estimate of cost savings in each of these examples has been based upon a combined labor and overhead rate of $4.00 per hour, which is conservative in these times.

These examples demonstrate the type of components best suited for production by shell mold casting. Gray iron sand castings with multiple secondary operations, or difficult assemblies of machined elements, can be profitably examined for possible conversion to shell mold casting.

How Shell Mold Castings Cut Machining Operations in Half . . .

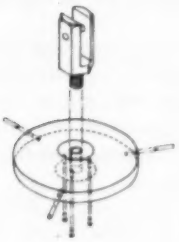
PART: Hand pulley gainer wheel.

OLD METHOD: Green sand gray iron casting with 21 machining operations, including the milling of 16 radial slots. Machine shop time required was 14 minutes.

SHELL MOLD CASTING: As cast in shell molds, the wheel requires only 11 machining operations, calling for a total machine shop time of only six minutes.

SAVING: Net saving is $ .53 per unit, with a 57 percent reduction in time.

How Shell Mold Castings Cut Machine and Assembly Time 94% . . .



PART: Mercury well float.

OLD METHOD: Main body was turned from three inch steel bar stock; center piece also turned from bar stock and straddle milled. Pieces were then assembled with six small pins in the rim and bottom of the main body. In all, there were 20 machining operations and seven assembly operations. Total time consumed was 36½ minutes.

SHELL MOLD CASTING: As cast in shell molds, the piece requires only three machining operations, no assembly operations.

Total machine shop time is now two minutes.

SAVING: Net saving is $2.30 per unit, with a 94 percent reduction in time.

How Shell Mold Castings Cut Shop Time from 50 to 7½ Minutes . . .

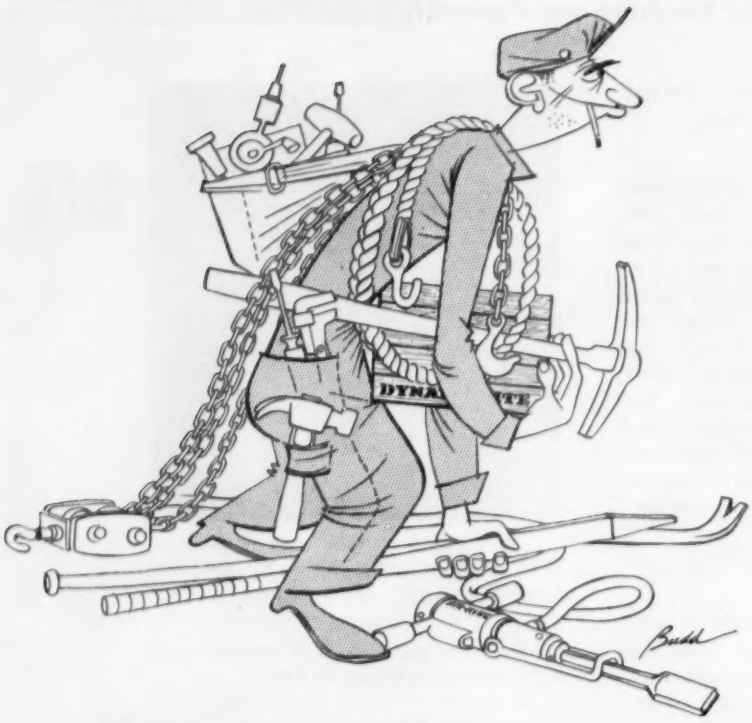
PART: Frame for a chemical feeder unit.

OLD METHOD: Green sand casting with 29 machine shop operations. A name plate was also assembled after the unit was finished. Total shop time involved in finishing and assembling was 50 minutes.

SHELL MOLD CASTING: As cast in shell molds, the piece requires only 15 shop operations for a finished piece. No name plate is required, since identification is cast in clearly. Total shop time required is 7½ minutes.

SAVING: Net shop saving is $2.86 per unit, with a reduction of 85 percent in time.

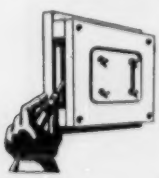
The castings of ferrous and non-ferrous metals in resin-bonded shells is the newest member of the precision casting family. PMM will bring you regular reports on this process including case histories and design data.



he's got everything but the ounce of prevention*

1. Dip blow pipe in Die Slick

2. Spray sparingly over die cavity face



3. Spray on ejector mechanism

Poor Hubert could put away his pounds of cure to remove stuck castings, if he'd only prevent them in the first place, with Die Slick.*

Die Slick puts an end to sticking, scoring, soldering, and other costly headaches caused by faulty die lubrication. It will not stain castings, assures good surface finish, often stops plating problems before they start.

Unlike home-made part-time lubricants, each of the five grades of Die Slick is uniform—standardized *to do its job all the time.* It's inexpensive, saves many times its cost. No wonder nearly four out of five die casters use it regularly.

We suggest you try—and prove—Die Slick on your most difficult job, on a no risk basis. Simply specify the quantity you desire and the type of alloy on which you will use it. If you're not fully satisfied, simply return the unpaid invoice.

start every job with

DIE SLICK

used by die casters everywhere

* smith's

"ounces of prevention"

It takes more than one compound to answer all die casting requirements. Here is brief information on the different Die Slick grades. More detailed information will be sent upon request.

Aids parting and ejection on difficult aluminum and magnesium castings. Non-staining. Enables better metal flow and fill-out of castings.

Expressly for brass castings—sometimes used on aluminum and magnesium. Extra heavy-duty compound with some lubricating graphite. Retains lubricity under high heat.

For clean, "hardware" finish zinc castings, where finest plating results are required. Assures maintenance of clean cavities, cores, ejector pins, and guide pins.

General purpose compound for zinc castings. Generally stain-free unless applied too heavily. Prevents sticking and scoring.

Standard Grade Die Slick, general purpose compound for aluminum, magnesium, lead and zinc castings. A high viscosity amber fluid not readily burned off by the heat of the dies.

Plunger-Slick is an adherent viscous grease that will not melt under highest casting temperatures. Used on plungers and all sliding parts. Prevents scoring, sticking, or wear, on cold chamber machines.

If full detailed information would be helpful, also a chart of where Die Slick compounds are most used, write for your free copy of our "Die Slick Data File."

Cordially,

V. W. Smith

PRECISION METAL MOLDING

G. W. SMITH & SONS, INC., 5403 Kemp Road, Dayton 3, Ohio

For additional information Circle No. 29 on the Reader Service Card

Here's what an industrial designer sees in die cast housings:

- Die castings allow crisp modeling where needed and smooth, perfectly blended contours as required.
- Developments of compound surface and complex intersections of unusual forms are perfectly controllable.
- Contours can easily be held to close tolerances and radii varied almost endlessly.
- Die castings allow variations in form and sharpness of modeling not possible in sheet metal or sand casting.
- Die casting edges are all "finished" as against the "thin" and sharp edges of sheet metal and the rough and irregular edges of sand castings.
- Die cast surfaces, as cast, are so perfect that no "heavy" finishing is required. Thus, precision surfaces are easily maintained in the finished product.

Portable Tools Need Precision in Appearance
as well as in dimension

BY PAUL KARLEN, S. I. D.,
Peter Muller-Munk Associates

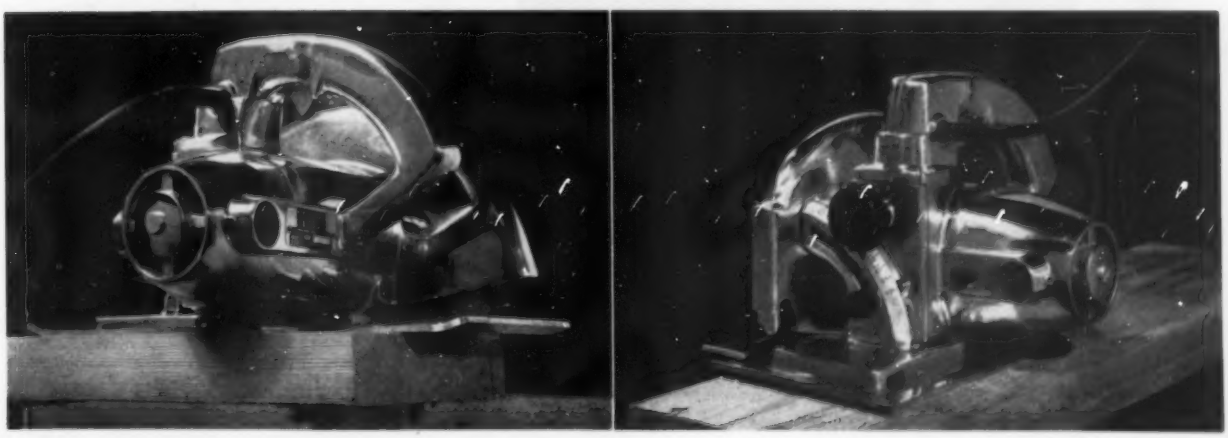
DIE castings are firmly established in the portable tool business today. Aluminum die castings have all the properties inherently required in portable tools—light weight, strength, ease of machining and precision.

It might be thought that a process so "natural" in its mechanical and physical characteristics must have some drawbacks that would limit its use. In our experience this is not the case.

Peter Muller-Munk Associates have been retained as industrial design consultants by The Porter-Cable Machine Company of Syracuse, New York, for some six years. In that period of time, we have designed about 30 portable

continued next page

Tools must "look the part" . . .



tools of which over 90 percent have been produced and marketed.

Almost all of the tools have used aluminum die castings. A very few have used, due to low volume, aluminum sand castings. Some have started experimentally as sand castings and then have been replaced by die castings as demand grew.

Porter-Cable had been using die castings for their products for some years before our association. In our early work and still today, we have helped to foster the use of die castings in their products. Why? Let us look at it this way.

Our objective as designers is to make a tool look as good as it actually is — to express

Looks, Balance, Function . . . by Die Casting.

in its appearance the quality and function of its mechanism.

Arthur Emmons, chief engineer of Porter-Cable, and his staff of development engineers have over a long period of years produced a consistently well-engineered line of tools. In this strongly competitive field, old concepts must be constantly replaced with fresh viewpoints and new ideas. Only those close to the development of such products can appreciate the high degree of inventiveness and ingenuity required in their solutions. Portable tool engineering is a creative art.

Our job then is obviously not an easy one. We must provide a housing that expresses the precision, the compactness, the ingenuity, the quality and the ruggedness of the mechanism. A handle must be supplied which is perfectly balanced, easy to grasp and positioned correctly for the operation to be performed. Ease of assembly and servicing must be considered.

Guards and other safety devices must be built in. Above all, to be a practical, portable tool, it must be as compact and as light in weight as possible. Die casting will allow the engineer and designer in collaboration to solve most of their problems.

The fluidity and flexibility of the die casting process allow the industrial designer to achieve precision appearance.

For additional information Circle No. 43 on the Reader Service Card

Before having steel dies made up for its die castings, this company gives full production testing to its new products by having plaster mold prototypes made. These use low cost tooling, give high accuracy, and give a dependable sample.

Here's an Inexpensive Way to

Preview Your Die Castings

BY KENNETH A. COOL, President.
The Service Recorder Co., Cleveland Ohio.

MANAGEMENT usually recognizes that output per man per machine is largely dependant upon the continued rapid cycling of the machine and does everything possible to maintain the machine in proper condition.

In larger shops it is common practice to have men specially assigned to the study of machine rates which imposes an overhead item that is, many times, quite costly. In the smaller shops such studies are impossible because of the cost involved and are, therefore, seldom done.

To help alleviate this problem of high cost time studies and to furnish a constant, written record of machine performance, the Service Recorder Co. has developed a Servis Machine-time Recorder. This device which can be used on any electrically actuated machine will give an accurate record of the time the machine is in operation; and, of course, the down-time. In addition, a wide variety of appurtenances can be attached to the recorder to give total elapsed time, cycle counts, etc. so that a complete picture of how the machine has operated during any given time period can be obtained.

This electro-mechanical time study man is completely free of human error and bias. In most cases it is welcomed by the machine operator as incon-

continued next page

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ALLOY MELTING BILL-ETTES
for Your
PRECISION CASTINGS

Over 30 different alloys produced under close laboratory control to exact product specifications in STANDARD SIZE 1" x 1" x 3". Packed in 100 lb. kegs, now available from stock AT NO EXTRA COST.

You get a Certificate of Analysis and Heat Number with each keg, plus further metallurgical assistance if and when needed.

Certified Alloy Melting Bill-Ettes provide the most efficient means yet devised to meet your precision investment casting needs. For specifications and prices write to Metallurgical Division —

CHARLES DREIFUS CO.

Serving the Steel Industry for over 65 years

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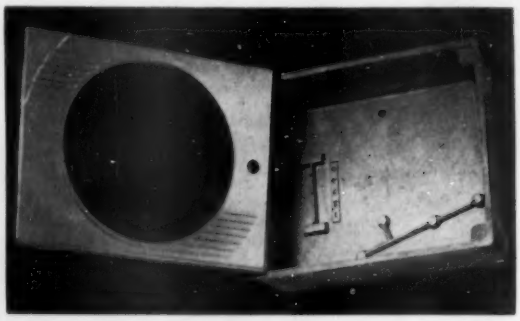


2. ACCURACY of castings makes gasket unnecessary.

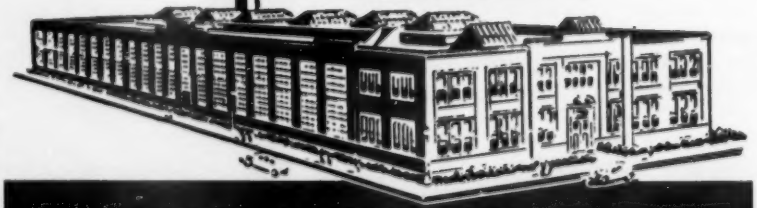
trovertable evidence that low output is a fault of the machine rather than the man.

The Servis Machine-time Recorder is relatively new and hence the number of units produced has been rather small. Because of this low production, the housing, which is a natural for the die casting process, is presently being made as a plaster mold casting in aluminum. This process of casting gives a case that is comparable in every respect to a die cast case so that tooling and all finishing operations can be worked out and evaluated without having high initial die costs.

As is evident in the illustration, Figure 2, the plaster mold casting process has been able to reproduce all necessary detail very faithfully. The numbers, which will indicate positions on a terminal board, are clean, clear and sharp.

continued on page 88

From One Source



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No matter what your die casting requirements may be, Central has the facilities, the equipment, the experience and trained personnel to produce castings to meet your rigid specifications.

Take advantage of Central's complete facilities and be assured of prompt economical service on the best castings made.

- Complete engineering and design service
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With A Die Cast Housing

Your Product Assembly Can Be Simplified

BY R. H. ROSSOMME, Chief Design Engineer, Bacharach Industrial Instrument Co. Pittsburgh, Pa.

1. BY MOLDING RECESSES to hold a pair of permanent magnets, the assembly of this air flow meter has been greatly simplified.

THE instruments used by heating and ventilating contractors and installers must have two characteristics. They must be rugged and inexpensive. Without these two features, instrumentation costs would be so high that only the largest firms could afford to use instruments to check an installation.

Bacharach Industrial Instrument Co. of Pittsburgh, Pa. makes just such a line of equipment and, in order to achieve the required degree of ruggedness and at the same time keep costs down, they rely, to a large extent, on both zinc and aluminum die castings.

Of the many instruments made for this service, the two that are to be described are typical and show how the die casting process has been able to slash machining and assembly costs. This dramatic application of aluminum die castings is another of the many applications where the ability of the process to include all types of mounting bosses, flanges and recesses in a single casting has *almost eliminated machine operations, lowered the number of assembly operations and eliminated or simplified separate fastening devices*, such as nuts, bolts, rivets, etc.

On the Florite, used to determine air flow in warm-air furnace installations, both the body and cover, are cast in aluminum by the Parker White-Metal Co. The cover is used as cast except for surface finishing.

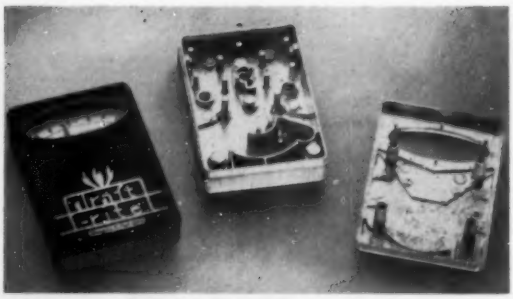
On the body casting a small amount of machining is required. Two holes must be drilled and tapped in the bosses provided to accommodate the machine screws that hold the cover in place. In addition, holes must be provided to take the adjusting screw and a mounting bracket for the rotating vane.

In this instrument, damping of the rotating vane is accomplished by two permanent magnets through whose field the rotating vane passes. The use of high field strength magnets has allowed the size to be decreased so that the two small recesses shown in the casting can be molded in to hold the magnets. This has considerably simplified the construction of the instrument and has lowered assembly costs.

continued next page

The Draft-rite, for flue draft measurement, shown in Figure 2, is a more spectacular application of die castings as far as reduction of assembly and machining operations is concerned.

That all of the holes, pins, and mounting bosses needed are cast in can be seen from the photograph. The draft cavity, controls, by its accuracy of size, the reproducibility from instrument to instrument within the same range.



2. CENTERS on mounting bosses are held very accurately.

Actual drawing specifications on width and depth of this cavity call for dimensional tolerances of ± 0.005, but the die caster of these parts, has consistently held these dimensions to less than half of the required tolerances.

Since this casting is produced in zinc, another economy has been possible. Low friction of the pivots is, of course, a requisite in such an instrument. The zinc die casting alloy in this case functions. very adequately as a bearing material, making the use of an insert unnecessary.

Finishing operations are quite simple. The inlet hole, which is cored in the casting, must be tapped to accommodate the draft tube. The face is sanded and any flash in the regulator cavity removed.

After these simple operations the outside is painted with a wrinkle finish and the instrument then assembled using the mounting pins cast-in for that purpose.

"Cleveland"
Die Castings
of Zinc or Aluminum

Avoid lost-time costs at point of assembly. "Cleveland" die castings, precision-made to your blueprints, fit right the first time, without forcing or extra machining.

Member of "The Certified Zinc Alloy Plan"

Prompt quotations... closest attention given to your delivery requirements

THE CLEVELAND HARDWARE AND FORGING COMPANY
3256 East 79th Street, Cleveland 4, Ohio
Our 72nd Year of Business

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BUYS CAMERA COMPANY

Albert Drucker, Chicago engineer and inventor, has announced the purchase, for an undisclosed sum, of Gundlach Manufacturing Corp., producer of professional cameras and custom lenses, in Fairport and Rochester, N. Y.

Drucker has resigned as secretary and chief engineer of Burke & James, Inc., Chicago manufacturer and distributor of photographic equipmnet, with whom he has been associated for the past 22 years.

Finishing Section

SURFACE FINISHING

Most precision metal molded parts receive some type of surface finish such as plating, organic coating, anodic coating, or chemical coating. This section includes information on the methods, processes and equipment used in these surface treatments.

A Section Devoted to Specialized Finishing of

Die Castings • Investment Castings • Powder Metal Parts
Permanent Mold Castings • Plaster Mold Castings

BY ROBERT O. JOHNSON,
Consolidated Vacuum Corp.,
Rochester, N. Y.

← vacuum metallized on zinc or aluminum look like chromium

No Polishing

Durability of vacuum metallized finish depends more on the lacquer coats beneath and above it than on the metal coat itself.
Here are some facts about getting a lasting chrome-like gleam on die castings.

HIGH vacuum metallizing is a method of obtaining brilliant, chrome-like coatings on zinc or aluminum die castings, as well as on other metal forms and molded plastics.

Because it is not usually necessary to polish or buff prior to this treatment, it is attracting more and more interest among users and processors of die castings, especially die cast decorative trim, toys, hardware items, novelties and giftwares in which polishing and buffing represent a major part of total piece costs.

Many questions have been asked about this relatively new finishing method, especially concerning the appearance and durability of the coating, type of equipment required and the methods used.

Here are answers to some of the basic questions, although no attempt will be made here to go into the technical phases of the vacuum metallizing process.

What is vacuum metallizing?

Three steps are called for in vacuum metallizing: 1) applying a lacquer or enamel undercoating as a base for metallizing; 2) depositing a thin film of metal by evaporation within a vacuum; and 3) applying a topcoating of clear lacquer or enamel to protect the metallic film.

Two of these steps are conventional finishing operations for which many plants already have equipment. Although special types of lacquers or enamels are required and have been developed, the standard equipment for spraying, dipping and baking are sufficient.

For the metallizing portion of the cycle, units such as the one illustrated are available, occupy a small floor area, and can be fitted into a finishing production line without difficulty.

coatings
die castings
plate, but . . .

Is Needed

Briefly, the metallizing process is as follows: work to be finished is mounted in specially designed racking fixtures and placed inside the vacuum chamber. Anywhere from 100 to more than 3,000 pieces can be processed in a batch, depending upon the size and shape of pieces.

The metal to be deposited, usually aluminum, is introduced in the form of wire which is attached to tungsten filaments and placed "strategically" inside the chamber so that the evaporated metal, traveling in straight lines, will condense on every surface of the workpiece that is to be coated. When electric current is passed through the filament, the aluminum wire is heated to its boiling point and volatilizes inside the chamber. Being unimpeded by air, it travels in straight lines onto the workpieces.

What quality of coating?

The metallic film gives the coating its desirable chromium-like appearance, but being

continued next page

Check list for lacquer requirements

Undercoating

1. Small surface porosity should be filled to eliminate possible gas entrapment that would subsequently harm the finish.
2. Irregularities such as are common on die cast surfaces: flow marks, cold shuts, etc., should be covered or minimized. Since the metallic film is so thin, it reproduces exactly the degree of smoothness imparted by the undercoating.
3. High gloss is necessary in order to give the same quality to the complete coating as is obtained by ordinary electroplating.
4. Good adhesion to the base metal, in this case, either zinc or aluminum die casting, is essential. Use of one of the chromate or phosphate type surface conversion treatments such as American Chemical Paint Company's Lithoform No. 32 is very beneficial.
5. Undercoating must be compatible with the topcoating. This not only includes adhesion between the two coatings, but also chemical and mechanical compatibility.
6. The undercoating should be a nonconductor to insulate the base metal from the metallized coating to preclude danger of galvanic action.

Topcoating

1. Although the undercoating can be and often is colored, the topcoating should be a clear, water white so that the only optical effect is that of the metallic film.
2. The topcoat should be able to withstand whatever service conditions the casting will meet. Thus, in different applications, abrasion resistance, chemical stability, weather resistance impact must be provided.
3. Where a dye is to be used to color the coating and give a color or tint, the film must be formulated so that it can be satisfactorily dyed.
4. As pointed out in item 4, above, the topcoat and undercoat must be compatible.

3-in-1 Honite Compound cuts burnishing costs up to 50%!

"Multi-Burnish" can be used with almost any metal, and with all types of barrel finishing media. It is completely soluble, making for free rinsing. Parts *always* come out with a high luster and clean surfaces.

New HONITE "Multi-Burnish" can *cut your burnishing costs in half* because it does the work of three or four ordinary barrel-finishing compounds, *and* produces brighter surfaces faster than ever before possible!

Here's why . . .

1. During the first part of its operating cycle, HONITE "Multi-Burnish" is a powerful cleaner that deburrs rapidly for 20 to 40 minutes.

2. In its second phase, "Multi-Burnish" Compound develops progressively richer suds which act both as a lubricant and a suspending agent, resulting in high luster and brilliant color on the work pieces.

WRITE TODAY for FREE demonstration in your plant of HONITE "Multi-Burnish" Compound

Honite®
"CLEAN CUT"
COMPOUND

"Clean-Cut" is a rapid, clean-working surface cutter which has the extra advantage of being a semi-burnishing compound. Too, it will not darken the surface of light metals.

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"SPEED CUT"
COMPOUND

"Speed-Cut" is one of the fastest-cutting of all abrasive compounds —contains an abrasive which is next to diamond in hardness. "Speed-Cut" may be used with chips or in a self-tumbling process.

YOUR HONITE DISTRIBUTOR has a complete line of compounds to meet your every barrel finishing need. He'll be glad to work with you to find the *right* compound for your job . . . and develop special compounds if necessary.

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Dept. PM-24, St. Paul 6, Minn.

☐ Yes, I'd like a FREE demonstration of HONITE "Multi-Burnish" Compound.

☐ Send me free copy of booklet "Barrel Finishing Manual" which contains complete information about HONITE barrel finishing compounds.

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Made in U.S.A. by Minnesota Mining and Mfg. Co., St. Paul 6, Minn.-also makers of "Scotch" Brand Pressure-Sensitive Tapes, "Scotch" Sound Recording Tape, "Underseal" Rubberized Coating, "Scotchlite" Reflective Sheeting, "Safety-Walk" Non-slip Surfacing, "3M" Abrasives, "3M" Adhesives. General Export: 122 E. 42nd St., New York 17, N.Y. In Canada: London, Ont., Can.

3M

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only a few millionths of an inch in thickness, depends upon the lacquer or enamel undercoating and topcoating for adhesion, durability and other properties. It is, in fact, a thin sandwich of metal sealed between coatings of suitable organic materials.

In addition, the undercoating serves another valuable purpose, sealing small porosity, filling small flow marks or surface defects which would otherwise require polishing, and providing a high gloss which is, in turn, reproduced by the metallized film.

Since the properties of the coating depend so largely upon the undercoating and topcoating it would be well here to list some of the desirable characteristics to be looked for in these coatings. The performance of coating materials developed especially for use with metallizing is discussed elsewhere in this article.

Casting quality

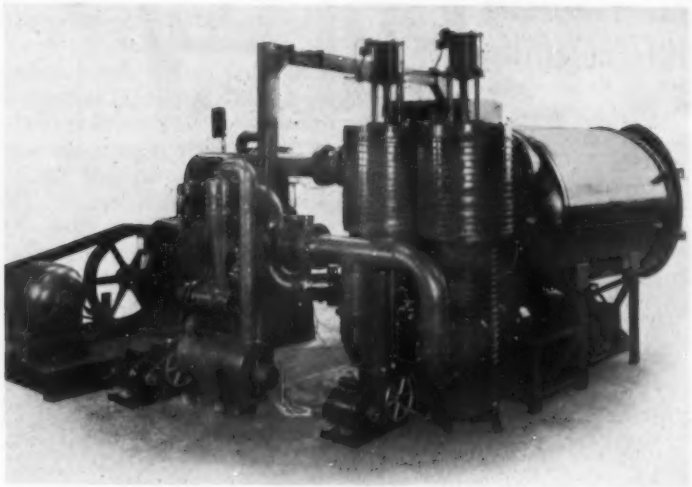
The quality of the casting is very important, and a good "hardware" finish is desirable. While small porosity and surface defects are readily filled, covered and smoothed by the undercoating, the larger depressions are possible sources of gas entrapment. Thus, all surfaces to be finished should have smooth, dense skin layers.

With high quality surface on a die casting, the only preparatory steps would be the trimming of flash, blending the flash root where necessary, and degreasing.

Undercoating and topcoating data

Because of the critical nature of the organic coatings used in conjunction with vacuum metallizing, closest attention must be paid to these

What type of equipment is needed for vacuum metallizing die cast parts on a production basis . . . ?



ONE of the standard models of high vacuum metallizing equipment now available is this Consolidated Vacuum Corporation Model LC 1-48A which has a horizontal vacuum chamber with a nominal diameter of 48" and length of 60".

While production capacity is a function of the piece size to be handled, this unit will process at least three complete loads per hour and, in some cases, four loads per hour.

The unit is supplied to the customer dismantled, so that he is required to wire various mechanical and diffusion pumps, to do a relatively small amount of assembling of components, and to supply water for cooling the pumps.

Normally, it requires about three days to install the unit and to put it into full operating condition. It is recommended by the manufacturer that one of its own installation engineers supervise the installation.

Floor space requirements — 12' x 12' x 12'

Utilities requirements — Power, 22v, 60-cycle, 3-phase, 3-wire, 125 amp.; Water, 50-150 gallons per hour; Air, 50 psi.

materials. Several coating materials have been developed and tested specifically for this use. Three manufacturers who make these special coatings have furnished information on their materials.

•

Red Spot Paint & Varnish Co., Inc., has developed material called "Metallizing Enamel for Metal" which has been tested on zinc and aluminum die castings.

Original evaluation of this product included the metallization of untreated steel panels which were then subjected to impact, along with humidity tests run at 100 percent relative humidity and 110F. The system is reported by the manufacturer to show good resistance to softening and discoloration under prolonged tests. Accelerated weather tests also indicated good resistance to discoloration or deterioration. After 500 hours, the film was still providing effective protection, although impaired in brilliance.

Similarly, 500 hours humidity testing on raw zinc die castings is reported to produce no softening of the film or blistering. Tests were run at 100 percent relative humidity and 110F.

Chief virtue claimed for this metallizing enamel is in its working application properties, in that it can be applied at relatively high solids, yielding a mirror image with freedom from Newton fringes.

Process cycle for application over the zinc die casting illustrated includes: basecoat baked 45 minutes at 300F and topcoat baked 30 minutes at 275F.

•

Boydell Bros. Co. has developed a clear synthetic baking enamel identified as 17-25B. This synthetic enamel is used for both the binder coat and the finish coat in vacuum metallizing, and is an alkyd-amine combination that was first used during the critical nickel shortage of a few years past.

This synthetic enamel was used over copper-based chromium finish to provide protection otherwise obtained by an intermediate nickel plate. Various manufacturers used this material, including the automotive industry, with satisfactory results.

For the binder film, or undercoat, the manufacturer suggests that the material be reduced approximately 20 percent with Xylol or equivalent, to a viscosity of from 15 to 18 seconds in a No. 4 Ford cup.

The piece that is to be coated can either be dipped or sprayed, with a resultant film thickness of from ½ to ¾ mil.

continued next page

AMERICAN CHEMICAL PAINT COMPANY

AMBLER ACP PENNA.

Technical Service Data Sheet
Subject: INDEX OF ACP CHEMICALS FOR METAL PRESERVATION AND PAINT PROTECTION

METAL	OPERATION	ACP CHEMICAL
ALUMINUM	Cleaning	"DEOXIDINE" "DURIDINE" "ACP RIDOLINES AND RIDOSOLS"
	Preparation for Painting	"ALODINE" "DURIDINE" "DEOXIDINE"
	Protection from Corrosion	"ALODINE"
BRASS	Brightening	"ACP BRIGHT DIP"
	Cleaning	"DEOXIDINE" "DURIDINE" "ACP RIDOLINES AND RIDOSOLS"
	Cleaning for Painting	"DEOXIDINE" "CUPROTEK
	Corrosion Prevention	"CUPROTEK"
	Soldering Flux	"FLOSOL"
COPPER, BERYLLIUM, AND COPPER ALLOYS	Brightening	"ACP BRIGHT DIP"
	Cleaning	"DEOXIDINE" "DURIDINE" "ACP RIDOLINES AND RIDOSOLS"
	Cleaning for Painting	"DEOXIDINE" "CUPROTEK"
	Coating Steel with Copper	"CUPRODINE"
	Corrosion Prevention	"CUPROTEK"
	Scale Modification	"RIDOXINE"
	Soldering Flux	"FLOSOL"
	Stripping Copper Coatings	"ACP COPPER STRIPPING SOLUTION"
GALVANIZED IRON, ZINC, AND CADMIUM	Cleaning	"DURIDINE" "ACP RIDOLINES AND RIDOSOLS"
	Corrosion Proofing	"ZINODINE"
	Paint Bonding	"ZINODINE"
	Phosphate Coating, in Preparation for Painting	"LITHOFORM"
	Soldering Flux	"FLOSOL"
IRON AND STEEL	Chromate Coating, in Preparation for Painting	"CROMODINE"
	Cleaning	"ACP RIDOLINES AND RIDOSOLS"
	Cleaning for Painting	"DEOXIDINE" "DURIDINE"
	Coating with Copper	"CUPRODINE"
	Drawing and Extrusion	"GRANODRAW"
	Paint Bonding	"CROMODINE" "DURIDINE" "GRANODINE" "PERMADINE" "THERMOIL-GRANODINE"
	Paint Stripping	"CAUSTIC SODA AND SOLVENT NO. 3"
	Phosphate Coating, in Preparation for Painting	"DURIDINE" "GRANODINE" "PERMADINE" "THERMOIL-GRANODINE"
	Phosphate Coating, to Protect Friction Surfaces	"THERMOIL-GRANODINE"
	Pickling with Inhibited Acids	"RODINE"
	Rust Prevention for Unpainted Iron	"PEROLINE"
	Rust Proofing	"PERMADINE" "THERMOIL-GRANODINE"
	Rust Removal—Brush, Dip, or Spray	"DEOXIDINE"
	Soldering Flux	"FLOSOL"
MAGNESIUM	Cleaning	"DURIDINE" "ACP RIDOLINES AND RIDOSOLS"
	Pickling	"RODINE (M-200)"
STAINLESS STEEL	Cleaning	"DEOXIDINE"
	Coating with Copper	"CUPRODINE"
	Pickle Polishing	"RODINE"
	Soldering Flux	"FLOSOL"

CHEMICALS ACP PROCESSES

WRITE FOR DESCRIPTIVE FOLDERS ON THE ABOVE CHEMICALS AND FOR INFORMATION ON YOUR OWN METAL PROTECTION PROBLEMS

CHEMICALS ACP PROCESSES

For additional information Circle No. 40 on the Reader Service Card

VACUUM METALLIZING — cont.

One of the most important features required for high vacuum metallizing is the assurance of proper cure for the undercoat; the more thorough the cure, the more successful the metallized coating.

Recommended bake schedule for this material is from 45 minutes at 270F to 15 minutes at 270F, with maximum temperature not to exceed 280F.

For the finish coat, 17-25B should be reduced about 20 percent with toluol or equivalent to viscosity of 15 to 18 seconds in a No. 4 Ford cup. Film thickness and baking schedule are the same as for undercoat.

●

Standard-Toch Chemicals, Inc. have developed a metallizing coating, identified as No. 1248. In four years of research, the company has introduced a number of specialized coatings for vacuum metallizing on various types of plastic materials, as well as metals.

The No. 1248 material is reported to be used both as an undercoat and a topcoat for aluminum, steel, brass and zinc. Application may be done either by spraying or dipping, with surfaces prepared by conventional degreasing systems.

The manufacturer has recommended caution in the use of thinner, pointing out that maximum dilution should not exceed 1-to-1.

Baking schedules recommended are: 30 minutes at 300F, 45 minutes at 275F or 60 minutes at 250F, but suggestion is made that baking schedule for zinc alloys should be somewhat lower temperatures.

After metallizing, the No. 1248 topcoat should be baked for 30 minutes at 250F. Because of the large number of variables existing in individual installations, the manufacturer has indicated that vari-

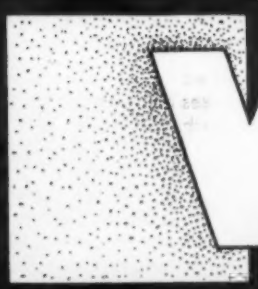
continued on page 66

VACUUM PLATING
ON
DIE CASTINGS

Gives Mirror-Bright
BRASS, SILVER or GOLD
COLOR FINISHES

Eliminates Polishing and Buffing
— Merely remove parting line.

Write. Wire or Phone



VACUMET, INC.

1009 WEST WEED STREET
CHICAGO 22, ILLINOIS
Telephone MOhawk 4-5989

Vacumet-Plated Means Lasting Brilliance

Product Facts

Catalogs · Manuals · Brochures

FINISHING

Technical Service to Industry 170
The Federated Metals Div. of American Smelting and Refining Co. has available over 43 different pieces of technical literature covering a wide variety of industrial alloys and processes. A listing of these free publications is available.

Protective and Bonding Chemicals 171
A brochure describing the various products they make for protecting metal surfaces and for bonding paint to metals is available from the American Chemical Paint Co.

Reamer Data Book 172
A "Shop Manual" has been issued by the Staples Tool Co., to provide users of carbide-tipped reamers with valuable data on carbide reamer sharpening and tool conditioning. The manual covers data on chamfer sizes, recommended clearance angles, methods of repairing O. D.'s and many other maintenance details.

Collet & Chuck Bulletin 173
A new collet and chuck bulletin has just been issued by Rivett lathe & Grinder, Inc. Collet users will find the new bulletin useful for its emphasis that precision depends not only on the quality of the machine, but equally on the method of mounting the work.

MATERIALS & EQUIPMENT

Engineering Manual & Catalogs 155
A group of nine new catalogs, one of which is an engineering application manual, have been published by the Hydraulic Press Mfg. Co. These catalogs each cover one particular group of air and hydraulic components made by the company, cylinders, valves, pumps, motors and accessories.

Instrument & Gage Bulletin 156
A new condensed bulletin has been published by F. W. Dwyer Mfg. Co. presenting the company's broad line of specialized instruments and gages. A wide variety of instruments and gages for measuring combustion temperature, draft, etc. are briefly, but clearly, described.

Shell Molding Machine 157
A four page brochure describing the new Shel-Kast machine for producing shell molds is available from the Safety Vulcanizer Co.

Silicate Sealing for Castings 158
Literature has been made available by the Philadelphia Quartz Co. covering the use of silicates for sealing porous castings, cast metal molding, investment casting cements and miscellaneous uses.

Recorder-Controller Bulletin 159
A four-page technical data bulletin covering multipoint circular chart recorders has been issued. The bulletin describes and illustrates many new design features which make this unit unique. According to the manufacturer, the Fielden Instrument Div. of Robertshaw-Fulton Controls, six individual records can be made.

Precision Dial Instruments 160
A complete catalog of all of the types and styles of dial indicators made by Geneva Dial Indicator Co. has been published. The 15-page catalog is thoroughly illustrated and lists accessory equipment as well as the dial indicators.

Small Hydraulic Press 161
A four-page brochure from Pasadena Hydraulics, Inc. describes the 20-ton hydraulic press now being offered by that company.

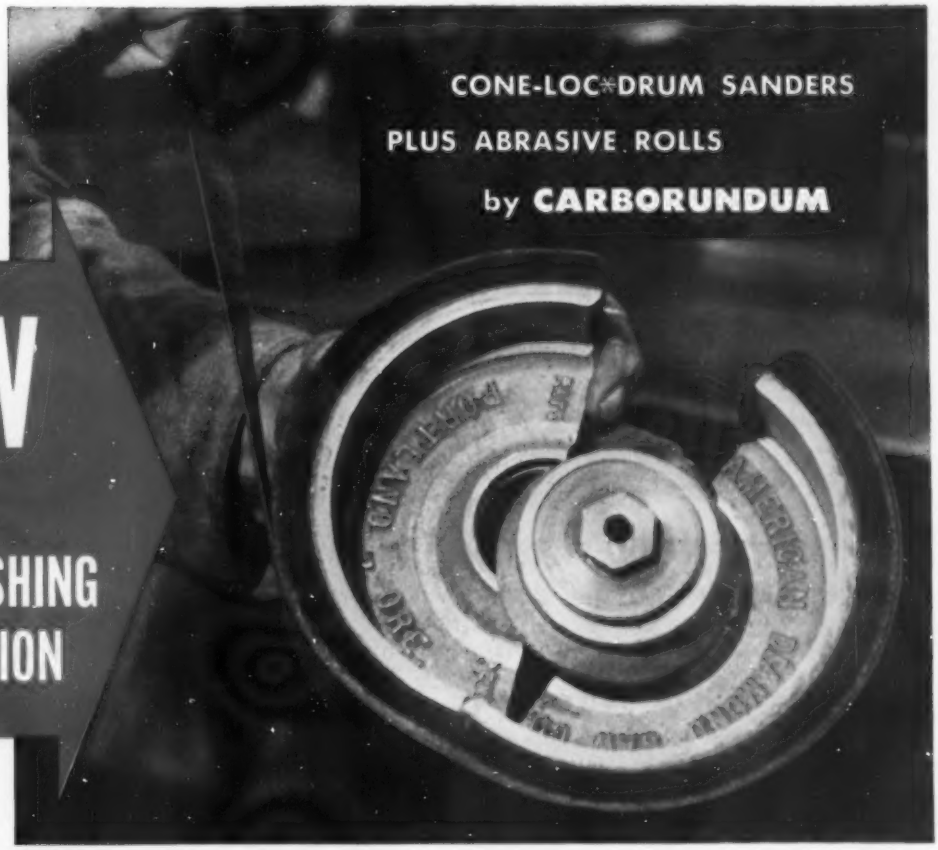
Chromium Carbides 174
Firth Sterling, Inc. has issued a four page booklet listing the properties and uses of chromium carbide-nickel and chromium carbide-titanium carbide-nickel compounds.

Investment Castings 175
An informative article, 16 pages, on investment casting is available from Arwood Precision Casting Co. The article includes tables of ferrous and nonferrous alloys recommended as most adaptable for this process.

Sleeve Bearings 176
The Johnson Bronze Co. has a three page illustrated technical data brochure which describes and shows how to select the proper bearing material.

Tungsten Carbide Parts 177
Complete information on a variety of custom made tungsten carbide components is included in a nine page illustrated booklet from Sintercast Corp.

continued on page 68



NEW LOW-COST POLISHING COMBINATION

*"CONE-LOC" is a registered trademark of American Diamond Saw Sales.

● The CONE-LOC Drum Sander is ideally suited for flexible shaft work.

● There are no shoulders to keep you from sanding in corners.

Polishing costs hit bottom when you use coated abrasive strips cut from Abrasive Rolls by CARBORUNDUM with the CONE-LOC Drum Sander—a light, balanced, safe polishing wheel ideal for use on flexible shaft tools or stationary bench grinders. The abrasive strips are held securely around the wheel by the hinged halves, when the arbor nut is tightened against the locking cone washer. The assembled wheel performs the same as a solid wheel—cuts smoothly... is perfectly balanced... *never* bounces at the joint. Worn abrasive strips are replaced in seconds.

Compare the abrasive costs: Reheading a setup wheel 6½" x 1" costs approximately 21 cents. An abrasive belt of the same area costs up to 17 cents. A 22" strip of Metal Cloth, Industrial Cloth, Resin Industrial Cloth, or Waterproof Cloth—cut from a 1" Abrasive Roll by CARBORUNDUM—costs you *5 cents or less.*

CONE-LOC Drum Sanders are equipped with rubber or felt cushions for smooth, even cutting. A sturdy backing flange is part of the assembly... insures extra strength and safety. Distributed exclusively by The Carborundum Company.

CALL YOUR CARBORUNDUM DISTRIBUTOR OR SALESMAN today. Find out how you can use coated abrasives to do a better polishing job... faster ...at less cost. Look for the CARBORUNDUM Trade Mark under "Abrasives" in the yellow pages. Or send this coupon.

THE CARBORUNDUM COMPANY, Dept. PM 82-43, Niagara Falls, N. Y.

Please rush bulletins on CONE-LOC Drum Sanders and Abrasive Rolls by CARBORUNDUM.

NAME _____ TITLE _____

COMPANY _____

STREET AND NUMBER _____

CITY _____ ZONE _____ STATE _____

CARBORUNDUM

REGISTERED TRADE MARK

...continually putting more SENSE in your abrasive DOLLAR

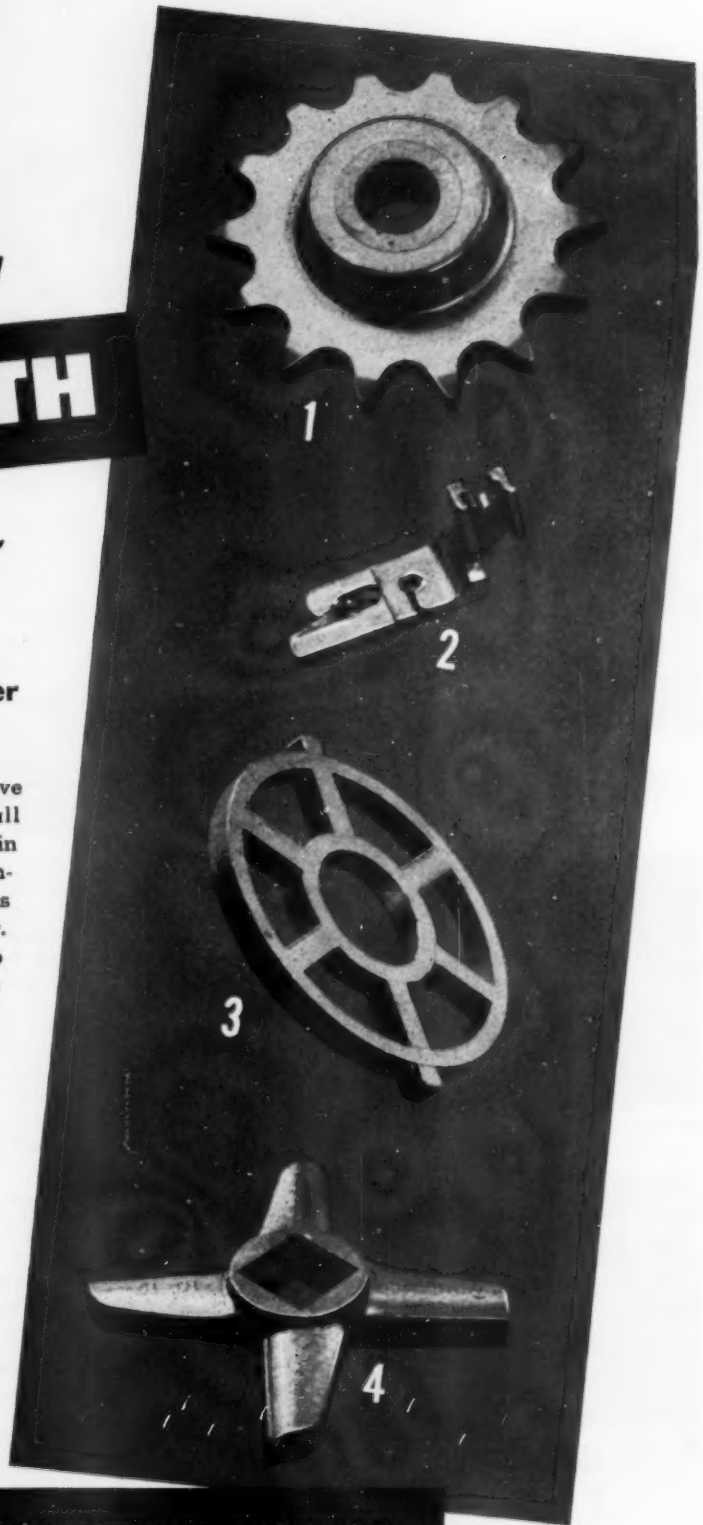
82-43

For additional information Circle No. 30 on the Reader Service Card

if you want

STRENGTH

in your iron powder parts,
take a look at these
compacts made from
HVA electrolytic iron powder



These four typical structural parts have a common denominator: they are all subject to high torque and/or impact in service. Strength is only one of the advantages designers can expect from parts made of HVA electrolytic iron powder. For example: ductility (elongation up to 32%), low porosity (part #2 is proof: it's chrome plated without impregnation) and excellent hardenability are only a few of the properties you can get. It will pay you to investigate all the ways that HVA electrolytic iron powder can improve your products.

PARTS	PROPERTIES
1. Motorcycle Sprocket	Ultimate Tensile Strength: 57,000 psi
2. Sewing Machine Hemmer Foot	Yield Strength: 46,000 psi
3. Meat Chopper Cutter Ring	Elongation: 15%
4. Meat Chopper Cutter Blade	

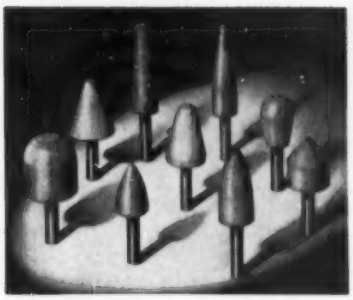
For facts on how HVA electrolytic iron powder can improve your product, write to:

A. JOHNSON & COMPANY, INC.

61 BROADWAY • NEW YORK CITY 6, NEW YORK

For additional information Circle No. 87 on the Reader Service Card

New Products ... the Reader Service Cards will bring full details

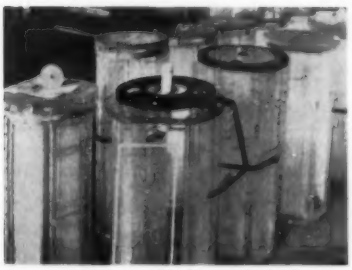


MOUNTED POINTS
. . . with cushion-like grinding action

Designed for use on all types of precision instruments and machinery, a new line of mounted points feature a soft cushion-like grinding action that cleans, polishes and deburrs all types of metals and plastics in one simple operation.

Bonded together with a special resin under an exclusive manufacturing process, the points produce an even, extremely smooth finished surface — eliminate the need for such time-consuming hand operations as filing, scraping, sanding and burnishing. There is no clogging or loading even on soft metals.

Atlantic Abrasive Corp.
For more information circle No. 196 on the Reader Service Card.



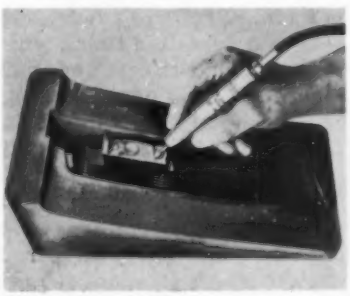
RECLAIM PLATING BARRELS
. . . with new replacement cylinders

A new replacement cylinder to fit any standard plating barrel superstructure is now available.

These replacement cylinders (lucite and plexiglass) are said to be the only complete line engineered to fit perfectly in all the standard makes of plating barrel superstructures.

The material of construction of these barrels is reported to be resistant to acids and alkalies, non-deteriorating and non-contaminating, transparent, lightweight, rugged and lasts indefinitely. Costs are said to be about 22 percent less than other cylinders.

The Singleton Co.
For more information circle No. 197 on the Reader Service Card.



HIGH SPEED PENCIL GRINDER
. . . has new safety features

Operating at speeds up to 100,000 rpm, a pencil type grinder is now available.

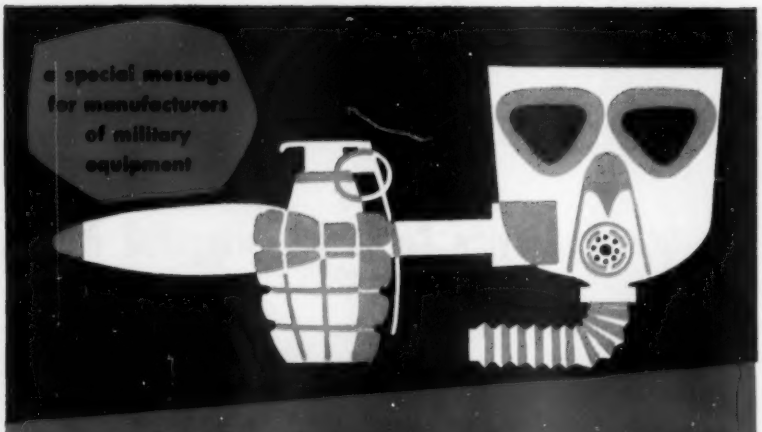
This grinder is said to be the smallest and lightest tool of its type on the market. A completely enclosed chuck nut prevents finger burns and gives more accurate control.

The light weight and small size reduce operator fatigue. The high speed makes the tool especially adapted to carbide burrs and triples the life of abrasive wheels. Production is increased and tool costs materially lowered.

The grinder is marketed with a new individual air filter and automatic lubricator, which add materially to the life of the tool. Machine shops and die makers find the tool especially valuable.

Nu-Jett Products
For more information circle No. 198 on the Reader Service Card.

continued next page



need a finish to beat these specs?

specify IRIDITE

AN-C-170 MIL-S5002 MIL-C-5541 AN-P32
AMS-2402A USA-50-80-11A J.Q.D. No. 144B
USA 57-93-2A O.S. No. 1374 USA 57-0-2C AN-P61
A-XS-1607 QQ-P-416 QQ-Z-325 MIL-3151 —
if you're finishing under these or similar specifications, here's how you can use Iridite:

ON ZINC AND CADMIUM you can get highly corrosion resistant finishes to meet any military or civilian specifications and ranging in appearance from olive drab through sparkling bright and dyed colors.

ON COPPER . . . Iridite brightens copper, keeps it tarnish-free; also lets you drastically cut the cost of copper-chrome plating by reducing the need for buffing.

ON ALUMINUM Iridite gives you a choice of natural aluminum, a golden yellow or dye colored finishes. No special racks. No high temperatures. No long immersion. Process in bulk.

ON MAGNESIUM Iridite provides a highly protective film in deepening shades of brown. No boiling, elaborate cleaning or long immersions.

AND IRIDITE IS EASY TO APPLY. Goes on at room temperature by dip, brush or spray. No electrolysis. No special equipment. No exhausts. No specially trained operators. Single dip for basic coatings. Double dip for dye colors. The protective Iridite coating is not a superimposed film, cannot flake, chip or peel.

WANT TO KNOW MORE? We'll gladly treat samples or send you complete data. Write direct or call in your Iridite Field Engineer. He's listed under "Plating Supplies" in your classified telephone book.

ALLIED RESEARCH PRODUCTS
INCORPORATED
4004-06 E. MONUMENT STREET • BALTIMORE 5, MD

Manufacturers of Iridite Finishes for Corrosion Protection and Paint Systems on Non-Ferrous Metals, ARP Plating Chemicals.

For additional information Circle No. 39 on the Reader Service Card

NEW PRODUCTS — cont.

HARD ARKANSAS STONE . . . for barrel tumbling

Because it fractures with a conchoidal shape, Novaculite, a hard Arkansas stone, is now available as a barrel finishing chip material.

The sharp edges and elongated points characteristic of the conchoidal fracture means that larger chips can be used to get into hard-to-reach cavities, doing the work of small chips without the danger of clogging.

In precision barrel finishing the chips are said to produce a mild honing abrasive action for a smooth, even finish without dents, burrs, or damage to stamped or cast parts. Because the chips do not charge the work with abrasives or extraneous materials, such as iron oxides, the manufacturer states that they offer particular advantages for finishing parts to be used in electronic assemblies or parts that would subsequently be used for plating.

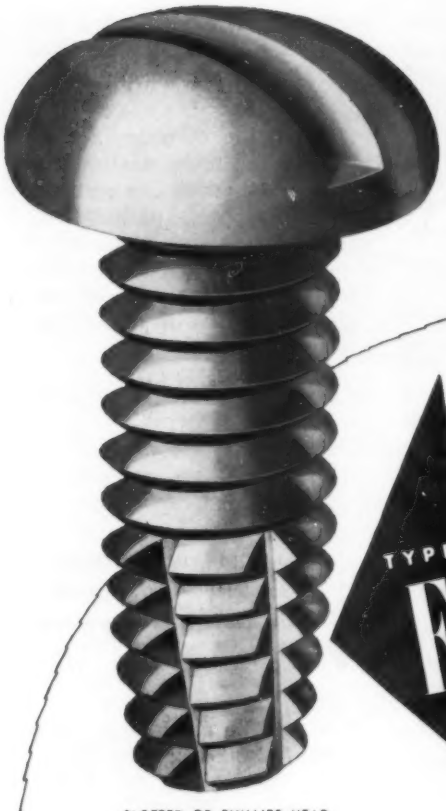
Chicago Wheel & Mfg. Co.
For more information circle No. 208 on the Reader Service Card.

ELECTRO-BLACK PROCESS . . . for most metals

A new black plating process provides for fast, economical deposition of a black plate on practically all metals except aluminum. On die cast metals, a thin copper or brass undercoat will suffice for pre-treatment.

The deposited finish will reflect the surface underneath without additional polishing or processing. In addition, it is easily high-lighted. The process is useful for both decorative and protective finishes.

The bath operates at one volt, with ten amps per 100 gallons of solution required; time is from three to four minutes at an operating tem-



SLOTTED OR PHILLIPS HEAD

The simpler way to save * on fastenings to metal and plastics

PARKER-KALON Hardened Self-tapping Screws

Originated by P-K, first choice today for fastenings to sheet metal, structural steel, non-ferrous castings and forgings, plastics, plywood, hard compositions. Here's why:

FASTER. No tapping. Simpler, faster than machine screws, riveting, or bolting. Cuts a standard machine screw thread as it's turned in.

STRONGER. No loose fits, mistapping, or cross-threading. Lasting tightness under vibration proved in millions of applications.

LOWER COST. Saves tapping time and tool expense, permits use of power drivers for faster assembly.

IF IT'S P-K . . . IT'S O.K. For guaranteed quality, get the Original, — specify P-K. Samples and application information free. Ask your P-K Distributor or write: Parker-Kalon Division, General American Transportation Corporation, 200 Varick St., New York 14.

* Up to 50% and more. Ask a P-K Assembly Engineer to help you estimate your saving.

PARKER-KALON®

The Original **SELF-TAPPING SCREWS**

The INDUSTRIAL DISTRIBUTOR steers your Supply Dollars to the best values.

For additional information Circle No. 32 on the Reader Service Card

perature of 150F. A steel tank can be used with either stainless steel or copper anodes.

Enequist Chemical Co., Inc.
For more information circle No. 200 on the Reader Service Card.

FLAT LAPPING MACHINE . . . produces micro-finishes quickly

A new, precision machine recently announced for highly accurate flat lapping of all types of metals and non-metals, is said to be ideal for finishing all manner of pieces requiring exceptionally flat and smooth surfaces such as sliding or rotating parts, gages, seals, valves, die casting dies, etc.

The machine has a 24-inch diameter, 2-inch thick lapping plate made of special, close grained cast iron, properly heat-treated and constructed to prevent distortion. The top has a grooved Archimedian Spiral.

The machine requires no chucks, collets, holders or tools and any average machine operator or factory worker can perform precision lapping operations without having had special training, according to the manufacturer.

In use the operator simply holds and manipulates the work on the revolving abrasive covered lapping plate, exercising just enough pressure to maintain the work in position. Thus the heavy work of lapping is done by the machine, not the operator.

Spitfire Tools Co.
For more information circle No. 199 on the Reader Service Card.

VACUUM METALLIZING
continued from page 58

ations can be established as a result of plant observation.

Is vacuum metallizing a production process?

Best answer to this question lies in the fact that a number of companies are already using vacuum metallizing on zinc die castings.

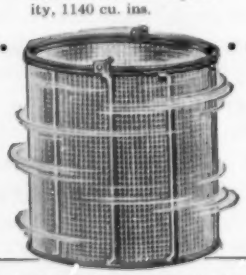
One midwest hardware manufacturer has a complete production installation in operation, while another toy manufacturer is using this process for the coating of such items as toy cap pistols. The automotive industry is giving serious consideration to this process for coating decorative trim die castings, and one Eastern jewelry company is applying vacuum metallized coatings in silver, gold and colors, obtained by dyeing.

Comparative costs are difficult to analyze except in the case of individual castings. However, the cost of polishing and buffing is eliminated. Vacuum metallizing is definitely a low unit-cost method which promises a wide range of applications among the users of die castings.

PAYS FOR ITSELF... IN TIME SAVED

Kreider Dryer with auxiliary steam heating unit (illustrated). Auxiliary natural gas heating unit available; also standard model without auxiliary heating.

Basket (below). Heavy gauge woven steel mesh over steel frame. Capacity, 1140 cu. ins.



Spin-Dries* up to 50 pounds in less than 2 minutes

Saves drying time. Kreider Dryer operates on ¾ h.p. at 625 r.p.m. . . . cuts drying time to as little as 35 secs.—no more than 2 mins.—for each 50 lbs.

Saves production time. Runs at top speed with maximum load, hour after hour, day after day. Ends drying "bottle necks". . . assures smooth, evenly dried surfaces, longer lasting lustre—fewer "rejects."

Saves maintenance time. Simple, sturdy construction reduces "time-outs" for repairs and servicing to a minimum. Assures long life.

See for yourself! Write Department PR-24 today for illustrated 4-page folder . . . also addresses of installations near you.

New Holland Machine Co., New Holland, Pa.

***Only 2 simple steps required...**
(1) Operator places wire mesh basketful of small parts in Dryer . . . turns motor "ON."
(2) Operator turns motor "OFF" . . . presses foot brake . . . removes basket.

NEW HOLLAND KREIDER DRYER

For additional information Circle No. 58 on the Reader Service Card

Come to TUMBLE GRAV-I-FLO FINISH

for higher lustre— smoother finish on metal parts

You can get a far superior finish on metal parts with the Super-Brite chips and compounds employed in the Grav-i-Flo Tumbling Process. Developed by originator of modern mechanical finishing, these materials also cut much faster, and eliminate the need of transferring parts from the cylinder between roughing and finishing operations. They likewise eliminate subsequent operations such as ball burnishing for color.

And, the time-saving Grav-i-Flo process for finishing and deburring cuts direct labor costs too. Hundreds of companies are getting better finishing and deburring results, faster and cheaper. If you haven't checked these advantages to your competitive position, do so today! Invite Grav-i-Flo to make recommendations.

Grav-i-Flo offers complete equipment, accessories and supplies for all your tumbling needs!

Model 66", two compartments

Model 48", two compartments

Machines. Grav-i-Flo 66", 48", 36", 32", and 24" machines have cam locked doors with manually released safety stops; available with unlined or rubber lined cylinders, constant or variable speed drive, J.I.C. controls, and timers from 5 minute to 20 hour cycles. Equipped with electric wiring and water piping installed ready for plant hook up.

Model 36", two compartments

Model 32", two compartments

Model 24", two compartments
Designed For Small Lot Production and Laboratory Processing.

Compounds. Grav-i-Flo natural and synthetic deburring and finishing chips and highly developed compounds consistently outperform every type of tumbling process offered on the market.

Investigate. Grav-i-Flo superiority in equipment and supplies has been proved to hundreds of users in many different industries. Let us show you, too, at no obligation. Our representative will visit your plant, or you may send samples direct to us. Engineering Service available to all users.

SEND FOR CATALOG showing complete line of Grav-i-Flo equipment, accessories and supplies.

Grav-i-Flo Corp., Dept. PMM-2 Sturgis, Mich.
☐ Send complete catalog. ☐ Have Sales Engineer call. ☐ We are sending samples.

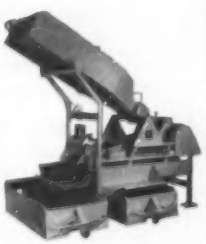
Company _____

Name _____ Position _____

City _____ State _____

GRAV-I-FLO CORPORATION 400 Norwood Avenue Sturgis, Michigan

ACCESSORIES



Two deck parts-and-chips separator and chip grader.

Occupies less floor space. Separates parts quickly without impingements. Grades 3 sizes of chips simultaneously.

Other Grav-i-Flo accessories include tubular yoke hoist pans, chip pans, wash-out doors, screens, chip bins, unloading boots, dip tanks.

For additional information Circle No. 31 on the Reader Service Card

Listed below are some of the operations discussed in Oakite's 44-page handsomely illustrated booklet on Metal Cleaning. Please check the list. Then let us show you how Oakite methods can give you better production with greater economy.

Technical Service Representatives in Principal Cities of U. S. and Canada

SPECIALIZED INDUSTRIAL CLEANING

OAKITE

MATERIALS · METHODS · SERVICE

OAKITE PRODUCTS, INC.
340 Rector St., New York 6, N. Y.

Tell me about Oakite methods and materials for the following jobs:

- ☐ Tank cleaning
- ☐ Machine cleaning
- ☐ Electrocleaning
- ☐ Pickling, deoxidizing
- ☐ Pre-paint treatment
- ☐ Zinc phosphate coating
- ☐ Paint stripping
- ☐ Steam-detergent cleaning
- ☐ Barrel cleaning
- ☐ Burnishing
- ☐ Rust prevention
- ☐ ALSO send me a FREE copy of your booklet *"Some good things to know about Metal Cleaning"*.

Name _____

Company _____

Address _____

For additional information Circle No. 57 on the Reader Service Card

USEFUL LITERATURE

continued from page 60

Light Metal Castings **178**
An eight page booklet from Thompson Products, Inc., Lightmetal Div., describes a complete line of die castings for different industrial applications.

Investment Cast Parts **179**
The advantage of centrifugally investment cast parts for custom manufacture of intricately designed parts and assemblies is given in a booklet from the Jelrus Co., Inc.

Prealloyed Steel Powder **180**
In a four page leaflet, Vanadium-Alloys Steel Co. discusses the advantages and the method of manufacture of prealloyed and stainless steel powders. Advantages and properties of compacts made from these powders are given.

Investment Casting **181**
A booklet entitled "Pour Yourself and Assembly" by Precision Metalsmiths, Inc. describes the advantages of investment casting and describes the company's facilities for making castings in 160 different metals and alloys.

Investment Casting **182**
Alexander Saunders & Co. has a 12 page illustrated booklet showing comparisons between investment casting and other methods of manufacture. The technique, equipment and supplies needed for making investment castings are given.

Aluminum Casting Alloy **183**
Technical data on Almag 35, a light weight aluminum casting alloy combining high strength, ductility and impact resistance are given in an eight page illustrated folder from Acme Aluminum Alloys, Inc.

Die Cast Parts **184**
Booklet No. G137 issued by Electric Auto-Lite Co., describes that company's facilities for the production of die cast parts.

Magnetic Materials **185**
In an eight page illustrated booklet, Arnold Engineering Co. gives tables, properties and applications of magnetic materials. Hysteresis loops, magnetization curves, etc. are given.

Investment Castings **186**
The advantages of investment castings, and a step-by-step description of how they are produced is in a four page booklet from Illinois Precise Casting Co.

Permanent Magnets **187**
Vol 1, no. 2 of Applied Magnetics, an eight page illustrated booklet from Indiana Steel Products Co., contains two articles on permanent magnets.

Iron Powder Machine Parts **188**
National Radiator Co., Plastic Metals Div., has issued a 28 page book on structural parts made from electrolytic iron powder. Some data on electrolytic iron powder is also given.

Investment Castings **189**
Typical examples of investment cast parts made from stainless steel, their advantages and potentialities, are given in a brochure from Midwest Foundry Co.

New Series of Die Cast Samples Being Tested as Part of ASTM Expansion in Studying Corrosion

The ASTM Advisory Committee on Corrosion, at a meeting held recently at the site of the International Nickel Company Harbor Island Test Station at Wrightsville Beach, North Carolina, took action to expand its test site facilities.

A billion dollars is a conservative estimate of the loss each year due to the corrosion of metals. The effects of atmospheric deterioration on plastics, rubber, textiles, wood, and other engineering materials would more than double this figure.

The American Society for Testing Materials long has recognized the tremendous economic significance of these problems and has been one of the foremost contributors to knowledge in these fields. Authoritative and impartial atmospheric and other exposure tests have provided engineers with reliable data for design and operation of structures and equipment of all kinds.

Projected programs of the ASTM technical committees as well as a number of requests from outside interests for the use of test site space has necessitated the preparation of additional facilities at the various test site stations. Although there is at the present some unused test site space at all of the sites in use, it was agreed that 110 additional racks be fabricated, 60 of monel (for marine exposure) and 50 of Type 302 stainless steel. These 110 racks will provide space for 7700 additional 4- by 6-inch specimens.

Although it was originally agreed that the ACC would provide racks of this type only, the Committee has since modified its earlier stand to agree to consider fabricating other types of racks, provided there are strong possibilities that they can be used by more than one committee, that is, for various programs.

Additional pipe frames have been constructed recently or currently are being erected to provide support for the specimen racks. This includes three frames at Freeport, Texas and three at Point Reyes, California. Each frame is capable of supporting ten so-called standard racks.

Within the next several years, initiation of a number of test programs is anticipated. Committee A-15 on Corrosion

continued next page

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CORROSION TESTS cont.

of Iron and Steel is planning a new hardware test and it is anticipated exposure will start in the spring of 1955. These hardware specimens will be exposed at New York, Kure Beach, State College.

A special task group of Committee A-10 on Iron-Chromium, Iron-Chromium-Nickel and Related Alloys has exposed during the past year at New York and Pittsburgh, a number of specimens designed to compare the behavior of chromium with chromium-nickel stainless steel.

A more extensive program of stainless steels which has been developing for a number of years is nearing the exposure stage and the actual exposure of the specimens is planned for mid-1954.

Committee B-3 on Corrosion of Non-Ferrous Metals and Alloys is planning to expose a number of specimens which have been stored and which were a part of the non-ferrous exposure program initiated by Subcommittee VI in 1931.

Subcommittee V on Exposure and Corrosion Tests of Committee B-6 on Die-Cast Metals and Alloys put on exposure early this year at Kure Beach, New York City and Columbus, a new series of tests on aluminum alloy SC84 with various amounts of zinc up to 2 percent. These exposures are for one, three, six and 12-year periods and the specimens are in the form of ¼ in. round tension specimens.

Committee B-7 on Light Metals and Alloys, Cast and Wrought, through its Subcommittee VIII on Atmospheric Exposure Tests has initiated a program which includes 30 aluminum alloys and 8 magnesium alloys. Specimens already have been put on exposure at New York City, State College, Kure Beach, and Point Reyes. An additional series of specimens will be mounted at Freeport, Texas pending completion of racks and frames at the location.

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Precision Castings by Universal

All of the varied castings shown above have certain things in common:

- They are very accurate.
- They have smooth surfaces, inside and out.
- They are metallurgically sound all the way through.
- They represent genuine savings.
- They have all been produced commercially by Universal Castings Corporation.

Some other things you will want to know about these pieces, cast in plaster molds, are:

- They have been cast in a wide range of alloys, high strength manganese bronze, aluminum bronze, nickel silver, brass and aluminum.
- They can be produced economically in any quantity, large or small.
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Excellent opportunity for machine designers experienced in die casting process. Right man will lead design group. Sales possibilities. Progressive established firm located, in central Ohio. Write details of experience and salary expected. Write Box 2154, PRECISION METAL MOLDING magazine.

SEVERAL sales territories open to represent high-quality eastern investment casting producer. Only those now representing comparable lines such as die-castings, forgings or sand castings need apply. Write Box 2254, PRECISION METAL MOLDING magazine.

Industry News

Companies · Plants · Associations

Mount Vernon Die Casting Moves Into New Stamford Plant

Gustav Nyselius, president of Mount Vernon Die Casting Corp., makers of aluminum and zinc die castings, announces the removal of the firm on January 1, to its new plant at Southfield Ave., Stamford, Conn.

The new plant, an all-concrete structure, has 165,000 square feet of floor space — more than twice as much as the building formerly occupied at Mt. Vernon, N. Y. It is a wholly self-contained unit, which houses comfortably the engineering department, the complete tool and die shop; a new zinc die casting set-up; an advanced design aluminum set-up operating integrally with two automatic electric furnaces, completely separated from the zinc divison; also 40 die casting machines, the finishing division, a modern metal recovery plant, as well as storage space for both dies and metals.

The reason behind the move is a long-felt need for more space. Mount Vernon Die Casting, founded in 1905, makes zinc and aluminum castings for a wide variety of industrial and consumer products.

A special feature of the new plant is an ingenious and skillfully designed overhead conveyor system, which effects great savings of time and motion by carrying the castings through every stage of production from start to finish and also by completely separating the zinc and aluminum divisions. It covers the entire area of the large floor space, and is believed to be the first of its kind in use by a producer of die castings.

A noteworthy feature of the move to the new plant was that it was made without serious interruption to production. Some departments of the plant in Mt. Vernon, N. Y., wer kept running as others were set up and started in Stamford.

SELL FOUNDRY FLUXES

"Foundrate" fluxes will be manufactured and sold by Eastern Foundry Supplies, Inc., Newark, N. J., under a new exclusive license. These fluxes, which are used throughout the foundry industry, have been manufactured by American-British Chemical Supplies, Inc. for many years. During recent years Eastern Foundry Supplies, Inc. has handled sales on an exclusive basis.

INVESTMENT CASTING FIRM MOVES TO NEW PLANT

The Investment Casting Company, 319 Chestnut Street, Newark, N. J., is moving into new quarters at 60 Brown Ave., Springfield, N. J., after February 15.

The move makes available larger and better facilities for the production of ferrous and non-ferrous investment castings and shell mold castings. Telephone number will be Millburn 6-6260.

DOW PROMOTES TUCKER

C. D. Tucker has been named production superintendent of the Bay City Division, The Dow Chemical Co., with responsibilities for the magnesium foundry, magnesium fabrication and machine shop, A. T. Peters, division manager, announced.

ROBERT K. BECK HEADS APEX SMELTING CO.

Robert K. Beck

W. A. Singer, chairman of the board, Apex Smelting Co., Chicago, has announced the election of Robert K. Beck as president. Mr. Beck, who has been vice president and general manager, succeeds Mr. Singer who has held the office of president since the formation of the company in 1923. All other officers and directors remain the same.

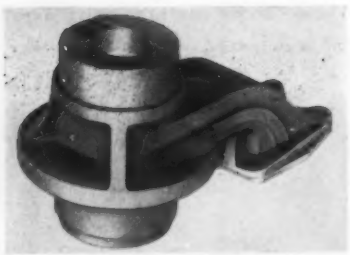
Apex Smelting Co. operates plants in Chicago, Cleveland and Los Angeles.

CORRECTION—The picture of Robert K. Beck, shown above, was incorrectly presented as Richard G. Tessendorf, new vice president of Aluminum Industries, Inc., in the January issue of PMM, pg. 78.

New 3d Film Shows How Frozen Mercury Investment Castings Are Made

A new three-dimension slide film series in color showing precision investment castings being made from frozen mercury patterns is announced by Alloy Precision Castings Company. The film is designed to aid engineers and executives in planning their products for mercasting to take maximum advantage of this new metal working process.

In making the announcement, S. E. Flenner, sales manager of Alloy Precision, stated, "Because the Mercast process uses frozen mercury patterns, it is possible to make patterns in two sections and then 'book' the sections with great accuracy. This makes possible one piece shapes previously impossible to cast or machine.



STARRING ROLE is played by this radar wave guide casting, in new 3-D film series.

"Complex shapes and intricate interior cavities can be held to tolerances of ±.003 inch per inch, even on a volume production basis. Parts can be mercast in any castable metal, including such hard-to-machine materials as pure nickel, monel, the Hastalloys, stainless steels, and Stellites."

The film, in 3-D Kodachrome, consists of approximately 45 slides showing steps involved in making typical mercastings. Two castings, one a valve body for a TV picture tube evacuating pump, and the other a radar wave guide, are shown at each stage of production from die to finished part.

"In the case of the wave guide," Flenner said, "the original design called for a fabricated assembly of approximately 27 different parts. Operations required precision jigging, brazing, silver soldering machining to highest tolerances, and difficult inspection. As a mercasting, this part is cast in one piece. The only machining operations involved are tapping and taking a finish cut on the bolting faces. Special ceramic investment materials used in the Mercast process enable us to hold dimensional tolerances and obtain surface finishes that reduce cost of production."

Arrangements for showing the film to designers, engineers, planning or production executives can be made by addressing Alloy Precision Castings Company, East 45th and Hamilton, Cleveland 14, Ohio.

UNIVERSAL
Die Castings

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There must be a reason why so many highly discriminating manufacturers entrust *all* of their work to us. The reason is they *know* from experience that the finished job will meet every specification as to appearance, strength, accuracy and function. Furthermore, the price on either long or short runs is in line with their production and selling costs.

If you are located west of the Mississippi River we are in an excellent position to take care of your die casting requirements. Quotations made promptly.

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Doehler-Jarvis Div. Appoints Works Managers For Two Plants

The following appointments in the Doehler-Jarvis Division of National Lead Company have been announced:

C. I. Hodgson has been appointed works manager of Toledo plant No. 1. Mr. Hodgson joined Doehler-Jarvis in 1931 as an apprentice die maker. He then became an electrical engineer, sales engineer, chief electrical engineer and Toledo plant No. 2 works manager.

K. F. Koegler becomes works manager of Toledo plant No. 2. After coming to Doehler-Jarvis in 1950 as an engineering department trainee, he was appointed administrative assistant to the research director, assistant to the chief engineer and assistant to the works manager of Toledo plant No. 1.

K. F. Koegler

I. R. Warshow, assistant division controller, has been named controller, effective January 1, 1954. Mr. Warshow joined Doehler-Jarvis in 1946 as assistant to the Chicago plant controller, and became successively assistant to Doehler-Jarvis Corporation controller, assistant corporation controller and assistant division controller.

C. Karsh, assistant to the division controller, becomes assistant division controller on January 1, 1954. Mr. Karsh came to Doehler-Jarvis in 1948 an internal auditor. Dr. S. T. Nicholson has been appointed medical director.

J. W. Thees will assume the duties of acting plant manager of Toledo plants No. 1 and No. 2. Mr. Thees has been with Doehler-Jarvis since 1932.

TELL-TALE PAINTS TELL HEAT

The extreme heat generated by jet engines and guided missiles calls for a new approach to temperature measurement. A promising new thermometer consists of paint which changes color with variations in temperature. Scientists at the Naval Research Laboratory have been able to establish a series of compounds that will record temperatures from 50C to 278C. Future compounds may indicate higher temperatures.

ACCURATE Magnesium Die Castings . . . a new note in WURLITZER ORGAN quality

Large two piece magnesium die cast reed holder produced for the Wurlitzer Co.

The change from a heavier metal casting to ACCURATE magnesium die castings reduced weight and production costs for the Wurlitzer Co. Priced competitively with heavier metal castings, these matched magnesium die castings were lighter to handle, machine, and assemble . . . are shock-resistant . . . non-rusting and dimensionally stable. ACCURATE die casting engineers would welcome the opportunity to work with you in adapting magnesium die casting to your product. Write today for recommendations and cost estimates.

Here are a few additional advantages combined in each ACCURATE Magnesium Die Casting:

- Light Weight
- High Strength
- Low Cost
- Fine Surfaces
- Close Tolerance
- Uniformity
- Laboratory Controlled Quality

Major Producer of Aluminum, Zinc and Magnesium Die Castings

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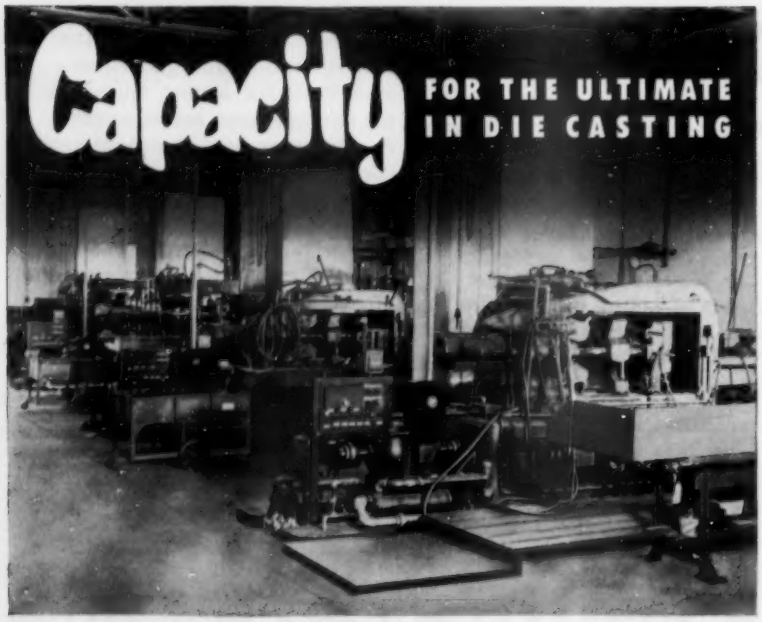

NE

A section of high-pressure aluminum casting machines (cold chamber) illustrates one of the many modern production methods that is part of our complete die casting services.

THE NEW ENGLAND DIE CASTING CO.

445 Front Avenue West Haven, Conn.

LETTERS TO THE EDITOR
continued from page 6

about the anodizing cycle, from start to finish, of these alloys.—W.J.S.

High silicon aluminum alloys are very difficult to anodize uniformly. Streaking and smutting are characteristics that cannot readily be overcome. However, at least one manufacturer of signal equipment is doing a very successful job of obtaining uniform, jet black anodized films over the 13 percent silicon alloy. Another manufacturer of die cast eye glass frames has been able to obtain bright, colored anodized coatings over aluminum, but we do not know which alloy has been used. Source of information has been forwarded.—Ed.

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- longer service life
- increased safety

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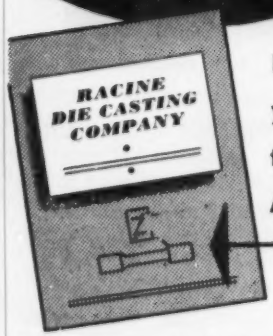

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Die castings to specifications . . . that's our specialty. You'll get the job done the way you want it when you specify Racine, and you can be sure your tools and dies are fully protected in our special fireproof storage vaults. We invite your inquiries and will welcome an opportunity to serve your die casting requirements.

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5,000,000 Parts From a Soft Die

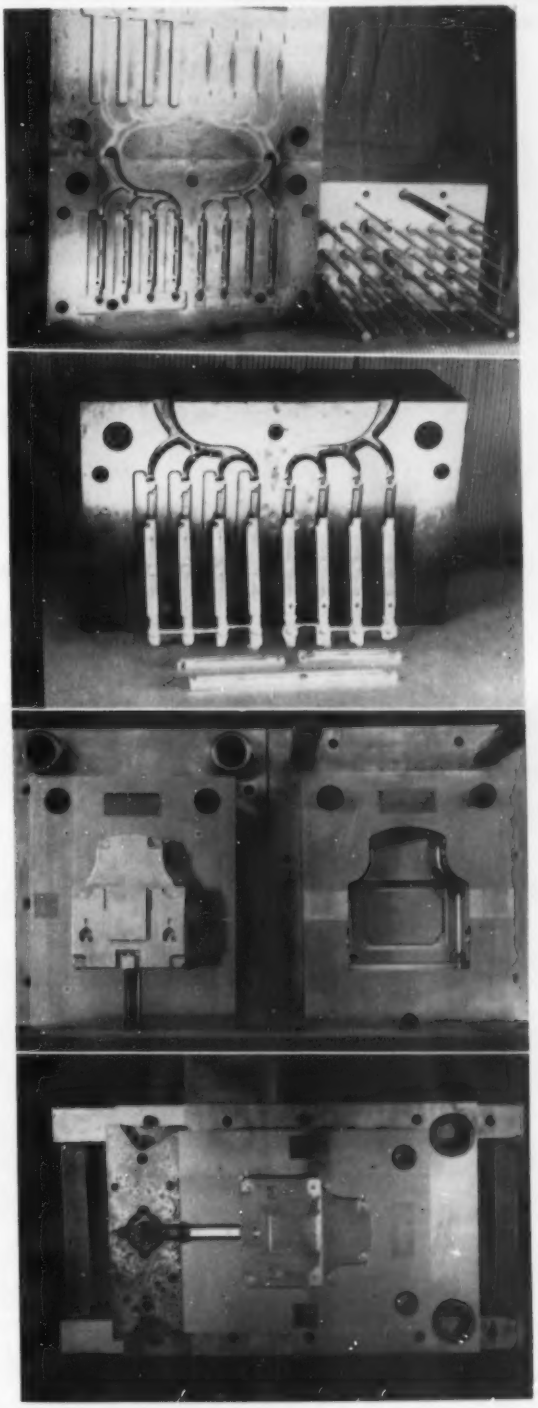
BY GEORGE MAECHLING, Tool Room Foreman,
Sunnen Products Co., St. Louis, Mo.

IF you know in advance that you will produce a million castings from a die, with all parts identical, you would very likely harden the die. Naturally, it would be less susceptible to damage in the hardened condition.

But suppose your production runs to only, say, 200,000 at a time. Or perhaps an engineering improvement in the part calls for a change in the die. Or maybe repairs in the die become necessary. Then a hardened die is a nuisance. Before any work can be done on a hardened die, it must be annealed. That makes it scaly and perhaps warped—regrinding is necessary. And the die may have shrunk in the annealing process — making it worthless in some instances.

The advantages of using soft dies are apparent immediately if there is a possibility that it may be desired to work on the

continued next page



1. THIS soft die has produced more than 5,000,000 parts.

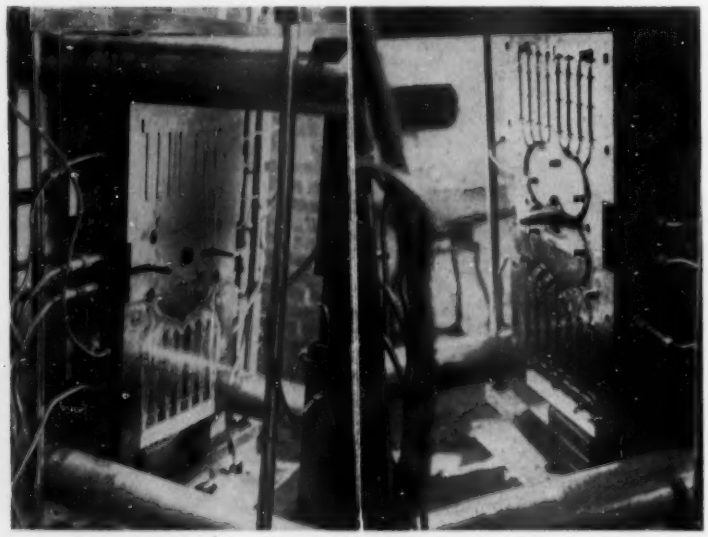
2. STONEHOLDERS are made of two die castings that hook together. The die makes four of each part.

3. NEW Sunnen gages are produced in this die.

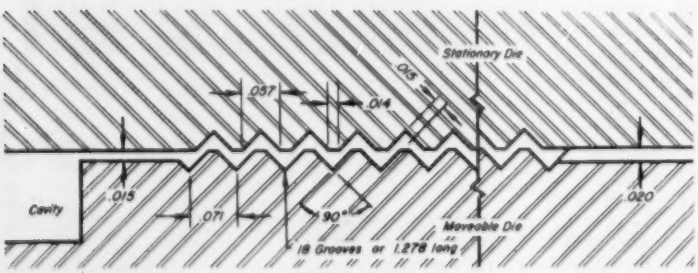
4. DETACHABLE sprue block is shown as used with gage die.

5. **THE new Sunnen gage is shown above, as used in an auto repair garage.**

6. **SPRUE block is shown below in machine with multiple die installation.**



7. **CORRUGATED vents that prevent gas build-up are detailed below.**



die some time in the future. The disadvantage of using soft dies are principally (1) Repairs may become necessary earlier than for hardened dies, and (2) More care is necessary for soft dies. For example, flash is blown off after each shot, and care is used in handling the dies in storage.

When soft dies are given reasonable care they are very serviceable and can be altered at a fraction of the cost of a hardened die. We at Sunnen have found from experience that Columbia Exl-Die tool steel is best for our purposes.

Figures 1 and 2 show our "SL" stoneholder die. The stoneholders will have an abrasive stone cemented to them and will be used in Sunnen Honing Machines to produce holes accurate to within a tenth of a thousandth of an inch. Such accuracy is greater than is necessary on the stone holder itself, however. We hold a tolerance of .001 on most die cast parts, with .0005 held in certain applications. This "SL" die has produced over 5,000,000 parts.

Note the water connections on the die. Water flow is controlled by the machine operator, to prevent hot spots from developing in the die.

Note also in Figure 1 that we show the ejector plate and pins. At first we made the complete pins from an air hardening steel, and they had a tendency to warp in the hardening process. When we used all 34 pins as a group the ejector plate was too tight.

We solved that problem by making each pin from high speed drill blank and brazing it to a soft piece of screw stock. The high speed blank is then held in a collet, and a center made in the end of the screw stock. The next step is to turn and thread the screw stock concentric with the high speed blank. We can drill and tap the plate from the die. All the pins are in line and the plate has very little drag.

Figures 3 and 4 show the die for the new Sunnen Precision Clearance Gage — a mechanical gage that measures to within a "tenth" without requiring skill or "feel" on the part of the operator. Fig-

ure 5 shows the gage in use in an automotive application.

Figure 4 shows clearly the sprue block or intake. Our sprue blocks are made so they can be used with a combination of dies. Figure 6 shows a typical set-up using one sprue block with several dies. The savings are high in comparison to the cost of having a sprue built into each die.

The corrugated vent shown in all the die illustrations is, so far as we know, original with Sunnen. This type of vent keeps metal from splashing by controlling the gases that build up in the die. The corrugations permit the gases to escape, but force the metal to follow a zig-zag channel. The molten metal also is kept in contact with the cooler metal of the die, and as a result it solidifies before it can get out through the vent. Figure 7 shows the detail of the vents, which are rather easily made.

R. J. COLVIN WINS D. C. BALL AWARD

John A. Carter, president of Oakite Products, Inc., presents the 1953 D. C. Ball Award to R. J. Colvin, Syracuse, New York, representative of the firm, one of the nation's leading manufacturers of industrial cleaning and related materials.

The award, presented annually in memory of the firm's founder to the Oakite representative who has rendered exceptional service to industry, was made at the regional technical-sales conference held at New York's Roosevelt Hotel in December.

CARBORUNDUM COMPANY BUYS STUPAKOFF CERAMIC

Agreement has been reached for The Carborundum Company to acquire the capital stock of the Stupakoff Ceramic and Manufacturing Company of Latrobe, Pa., according to an announcement by Major General Clinton F. Robinson, president of Carborundum in Niagara Falls, N. Y.

General Robinson said Stupakoff Ceramic and Manufacturing will continue operations under its present name and the present organization and personnel of Stupakoff will be retained under the direction of Semon H. Stupakoff, president of the company.

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NATIONAL MOLDED PRODUCTS, INC.

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PISTON RINGS
continued from page 37

resistance of piston ring material to chemical attack.

2. Increasing tensile strength for better tangential tension and, in relation to that, improving all other mechanical properties to an extent that the material would be considered steel rather than having the characteristics of gray cast iron.

3. Eliminating production uncertainties and the high cost of cast iron material;

Avoiding the extensive waste of material that occurs when producing

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...for Extra Values at No Extra Cost!

A pioneer in its field, Milwaukee offers you the experience and knowledge gained in helping others for more than 40 years, to realize the full benefits of the die casting process. In its modern plant, it offers you the most advanced facilities for the production of zinc and aluminum die castings. These extra values which cost you no more, can help you build extra values into your product, too.

We operate under the Certified Zinc Plan of the American Die Casting Institute, Inc.

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rings according to orthodox methods;
Eliminating the excessive reject quota, thus approaching automatic production.

Designers of present day high-speed, high-load engines, do not have to restrict themselves in their requirements because of piston ring material. The sintered piston ring has been accepted by the highly competitive gasoline and diesel engine industries. Considering the relatively short period of development and the existing standards set by an old established industry, it is reasonable to assume that engine manufacturers have found powdered metal rings to have some clearcut advantages.

How far has the inventor succeeded in this program? One finds the following:

1. Piston ring material made by sintering iron powder with various alloys can be produced in a eutectic pattern which closely resembles a desirable network of *phosphide eutectic structure*.

The sorbitic or pearlitic, or sorbitic-pearlitic microstructure can be produced depending on the type of engines and their requirements.

2. Carbon in the form of *graphite* can be produced also at will *in a fine homogeneous dispersion*, either in laminar or nodular shape. An absolutely uniform dispersal of graphite cannot be obtained in a casting method. This fact is most important when evaluating the basic differences between powder metallurgy and the casting processes for the manufacturing of piston ring material.

3. Powder metallurgy permits the use of the low temperatures of sintering and facilitates the inclusion of heavy metals as alloys. This increases the *resistance of the material to chemical attack* by the products of combustion in an engine without losing any of the desirable gliding qualities.

4. In order to give better mechanical properties to materials suitable for piston rings operating in high-speed, high-ratio engines, steps were taken to provide the material with *mechanical properties characteristic of steel*. Inherent tensile strength of 115,000 psi places this material in a special category far exceeding all other materials being used for piston rings. This material, which is gray cast-iron-like in its gliding and wear resisting characteristics, on the other hand can be provided with so much tangential tension that back-up rings are superfluous.

5. It is also important to note that it makes a *thermic treatment or hammering unnecessary* in order to improve the tangential pressure, and constitutes an economizing factor.

continued next page

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STROH'S superiority has won and held customers since the turn of the century.

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6. Together with the uniformity of structure it produces a uniformity in its wall pressure which might help to explain why the *sintered piston ring can operate from the very beginning with a full load.* The setting of rings belongs to the past, for the time element involved does not nearly resemble what is known in industry as the "break-in" of motors. This is especially true when big diesel units are concerned.

The economic aspects of producing piston rings by powder metallurgy are so important that they deserve special mention. Ring blanks are produced individually with little additional allowances for mechanical shaping. Sawing or cutting off blanks from sleeves is avoided.

In order to produce 250,000 rings, three inches in diameter, it is necessary to produce

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POWDERED METAL FABRICATORS

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Ground to Your Requirements.

Prompt Delivery

Price List on Request.

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5,000 sleeves with a weight of 65,000 lbs. when centrifugally cast. For the same number of rings, when made by powder metallurgy, 15,000 lbs. of powder are required. The price difference may be as much as 2-to-1 in favor of powder metallurgy when all costs are taken into consideration.

Due to the purity of the blanked material the manufacturing process is more suitable to automatic handling. Not only does the production of the blank, which substitutes for the casting process, permit a saving in tool investment, but also the machining can be adapted to automatic production, decreasing tool requirements and costs still further. This is the result of the uniformity and the absence of air bubbles, varying hardness of material within the same blank, and lunkers (accumulation of dirt).

As a result, the rejects quota of manufacturing, including the intermediate inspection, seldom exceeds five to eight percent compared to a reject quota of 18 to 25 percent occuring in other manufacturing methods. Not considering the outstanding features of sintered piston rings in operation, this feature alone proves that powder metallurgy is adding another economic accomplishment to its list.

The acceptance of powdered metal piston rings in Germany followed a pattern which is already historic in other developments. While established manufacturers of piston rings tried to convince designers and builders of combustion engines that powdered metal piston rings could not be manufactured for their requirements, a few pioneers tried them out anyway. From that time, when the designers worked together with the metallurgists in order to produce specialized material for specialized purposes, the results were gratifying.

Today, users of powdered metal rings in Germany are:

Deutz Motoren Werke, Koeln-Deutz
Karl Schmidt, Neckarsulm
Spilling Werft, Hamburg
Orenstein & Koppel, Hamburg

One of the oldest diesel engine manufacturing firms in the world also pioneered the application of sintered piston rings in its engines. In some instances, life expectancy of their units was increased by 100 per cent.

When tested in gasoline engines, the results were equally gratifying. A road test with five different cars showed no excessive wear after 105,000 miles of operation.

Evaluating the situation today, one can state that after millions of hours of operation in standard equipment, under all conditions, the sintered piston ring is an accomplished fact. Many hours of frustrating research and development have borne results which justify the expectation of the inventor.

PERFECT!

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ZAMAK (Zinc Base) DIE CASTING ALLOYS

Once you taste the difference between ordinary alloys and H. B. & S. you'll never have an appetite for anything but HENNING products.

We strap Zinc Base Die Cast bars on metal pallets of the same alloy to speed handling in your plant. H. B. & S. alloys meet all Government, ASTM and SAE specifications.

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(On that next order specify HENNING and be convinced of the difference.)

Are you receiving our monthly publication THE HENNING MESSENGER? We believe it will give you a chuckle or moment's relaxation during a busy day. Ask to be put on our mailing list.

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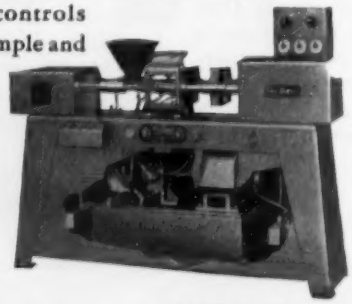
VAN DORNS for
molding styrene patterns

Semi-Automatic Injection Press

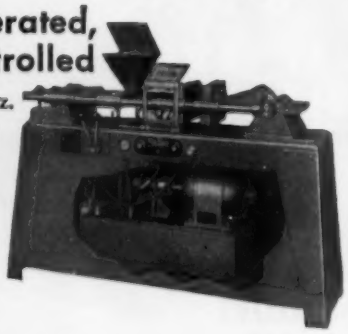
Typical precision parts produced by investment casting, using styrene patterns molded to .003" tolerances on Van Dorn Presses.

—2-oz. capacity. This ultra-modern press has push-button controls that are safe, simple and convenient. Accurate temperature regulation. Ruggedly built, compact and quiet.



MODEL H-200

Power-Operated, Lever-Controlled Presses — 2-oz. or 1-oz. models. Have many automatic and safety features.



MODEL H-200

Plastic Grinder — grinds up waste, rejects, etc., for re-use.

Mold Bases for these presses available from stock.

Write for information on this equipment.

MODEL G-100

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METAL POWDER ASSOCIATION LISTS PAPERS TO BE PRESENTED AT SHOW

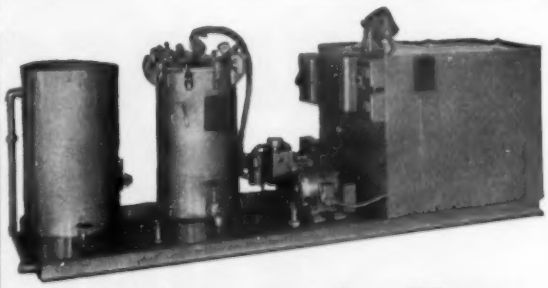
The Tenth Annual Meeting of the Metal Powder Association is scheduled for April 26-28 at the Drake Hotel in Chicago. Final arrangements have been completed, and preparations have been made for what is expected to be the largest attendance in the organization's history. Information can be obtained from M. P. A. by writing their office, 420 Lexington Ave., New York.

Technical sessions and a show will be open to engineers, business executives, purchasers and others interested in the expanding field of powder metallurgy. More than 800 attended last year's meetings and show in Cleveland.

Innovation in this year's program is the introduction of two simultaneous technical programs, one of general interest and the other directed specifically toward users and producers of electronic cores.

Program for the general sessions has been announced by Robert Ziegfield, secretary of the M. P. A.

Papers scheduled for April 27 include: *"Friction and Lubrication in the Pressing of Metal Powders,"* by Henry H. Haussner, Sylvania Electric Products, Inc.



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Model M-30

For low-cost, efficient impregnating of porous and leaking pressure castings, either ferrous or non-ferrous metals, use our MOGULLIZING Vacuum-Pressure System. The MOGULLIZER is made in all sizes from the small laboratory models of one cubic foot to the large industrial units with 100 cubic feet or more auto-claves (impregnating tanks). We obtain 29.5" or more of vacuum with this machine.

MOGUL Cast Seal is recommended with these units for impregnating all types of castings. No after-baking required.

Send us your problem and ask for booklet:
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"*Lubrication Practices with Metal Powder Bearings*," by J. R. Hicks, Socony Vacuum Oil Co.

"*Non-Destructive Testing of Sintered Brass Parts*," by Julian Rossnick, Frankfort Arsenal.

"*Powder Metallurgy in the Automotive Industry*," by Joseph Geschelin, Automotive Industries magazine.

"*Aircraft Applications for Powder Metallurgy*," by W. H. Woodward, National Advisory Committee for Aeronautics.

"*Powder Metallurgy versus Other Precision Forming Processes*," by C. S. Schroeder, Yale & Towne Manufacturing Co.

Papers scheduled for April 28 include: "*The Manufacture of Sheet Metal from Metal Powder*," by W. D. Jones, England.

"*Flame Plating in Powder Metallurgy*," by M. A. Teter, Linde Air Products Co.

"*Semi-Formed Drawing Stock by Powder Metallurgy*," by Robert Steinitz, American Electrometals Corp. and a representative from Frankfort Arsenal.

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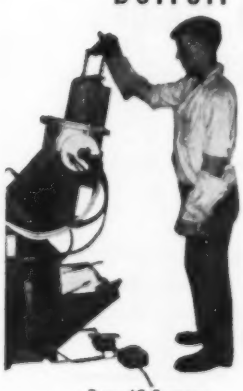
Investments...with new Detroit Furnace



Type IC Furnace with mold attached.

This new direct-casting Detroit Electric Furnace produces better precision castings in less time. Fast, indirect arc melting plus direct furnace-to-mold casting cuts production cycle to as little as 7 minutes.

Uniform melts bring lowest reject rate, increases over-all efficiency. Low power consumption, high utilization of heat for operating economy. Get full information on Type IC Detroit Electric Furnace for higher precision casting production. Write today!

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KUHLMAN ELECTRIC COMPANY
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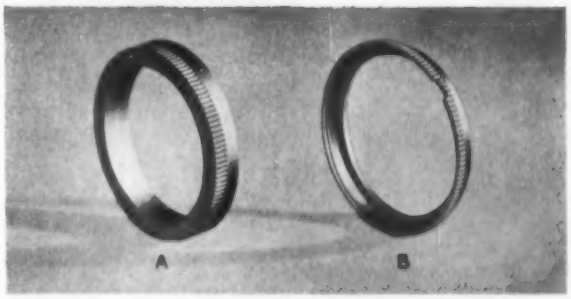
facts about

PRESSED BRASS POWDER PARTS



CASE HISTORY | No. 9

Production of the above brass ring B would, ordinarily, involve machining brass bar stock with a considerable scrap loss, or would start with sectioned tubing and require the use of an expensive broaching die to form the 120 serrations on the periphery.

By using a relatively low cost tool set, Blank A above is pressed from brass powder **complete with the serrations.** Machining the internal step, annular taper and notch generates only a fraction of the scrap and greatly speeds up production time.

23 ADDITIONAL CASE HISTORIES AND DATA ON DESIGN, PROPERTIES AND PRODUCTION

← HERE!

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THE NEW JERSEY ZINC COMPANY
160 Front Street New York 38, N. Y.

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There must be something significant in the **fact** that manufacturers keep coming back to LITEMETAL DICAST for *repeat* jobs. For example: In 1948, Maxitrol Corporation placed its first order with L-D. Since then, in spite of the fact that it had tried other die cast makers, Maxitrol now has LITEMETAL producing 90% of its die castings. Similar repeat business has been enjoyed from Belden, Western Electric, Buick, Chrysler, Keller Tool, and many others prominent in their fields. Such repeat business illustrates better than anything else the fact that LITEMETAL's close friendly cooperation from engineering to shipping is appreciated by its customers. These manufacturers know they have to look no further for their die casting needs.

The die casting of the new light weight alloys—aluminum and magnesium—is a great saver of time, materials and much of the labor otherwise required for machining and finishing. In addition, the savings in weight often effect reductions of shipping costs. The extensive experience of LITEMETAL in such products as the spools and gas regulators shown above in *single* units of aluminum and magnesium has proved efficient and economical. Many other examples can be offered to an almost unlimited field of industrial uses and applications.

Let's Talk It Over . . .

LITEMETAL DICAST, INC. is an organization of specialists — men thoroughly experienced in the casting and machining of magnesium and aluminum alloys. Our equipment includes big machines for big jobs — little machines for little jobs . . . the right sizes and types of the most modern die casting equipment for producing parts from the size of a button to large cable spools. Complete facilities for secondary operations are also available.

Write today for literature and design information.
Quick action on inquiries.

LITEMETAL DICAST Inc.
A DIVISION OF HAYES INDUSTRIES
1925 WILDWOOD AVE. · JACKSON, MICHIGAN
PLANT AND EXECUTIVE OFFICES

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CHEMICAL BUILDERS ELECT

J. H. Ruskin was elected executive vice president of Chemical Construction Corporation, it has been announced. G. I. Seybold and Martin de Simo were elected vice presidents, and Thomas P. Forbath was named assistant to the president.

MATCHED TOLERANCES
continued from page 41

keep close tolerances on the inside diameter since this involved a press fit.

PRESS FIT: The mean diameter of the tube called for 1.250 inches with the standard mean tolerance of ± .012 applying. The die casting extensions were then so dimensioned that at least .002 interference existed in each assembly combination. Matching possible tolerance variations showed that this interference figure could increase to .065 under the other extremes of matching tolerances, but this degree of interference was still considered acceptable.

The feasibility of making a press fit with this maximum amount of interference was tried and proved on commercial equipment. Although the press fit joint withstood severe

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"BETTER THAN EVER"

PEERLESS
STANDARDIZED PINIONS and RACKS
FOR
DIE CASTING PERMANENT PLASTIC MOLDS

Standard sizes of Peerless "Flame Hardened" Ejector Racks and Pinions are available for prompt shipment. Special sizes may be produced to your specifications.

We welcome your inquiries.

Peerless Gear & Machine Co.
320 N. WESTWOOD AVENUE
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Established 1921

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separation tests, the corner joints were crimped after assembly as an added measure of safety.

The hinge on the leg joint is located about 3½ inches below the underside of the litter pole. This hinge permits the legs to fold inward toward the center of the cot and parallel with the poles. The hinged joint is operated by pressing a spring-actuated button located on the inner side of the leg. Legs lock positively either in the extended or folded position and move freely without forcing. They hold in either position without the use of straps, clips or other devices.

At the base of the leg, the single male extension of another die casting is forced into the leg tube, and the contour of this casting permits its use either as a foot or mounted on top of the corner castings for stacking purposes. In actual stacking practice, the litter-cot can be compared to some types of quickly-erected aluminum scaffolding. When the legs are extended and stacked one on top of the other, the clearance from the underside of the litter pole to the bottom of the foot with legs extended is 20⅝ inches.

When the legs are folded under, the cot sits on the knee of the hinged joint. This makes the litter-cot 5⅜ inches high. This is about

SMOOTH, Accurate WAX Patterns

are cast Economically

with properly heated material.

Sta-Warm Model WV-5 gal. wax melting tank.

Accurate control of temperature in Sta-Warm Wax Melting Tanks and Pots helps you to heat wax to its free-flowing temperature . . . without overheating . . . without leaving cold lumps.

Inquire today for the tank or pot in the capacity you require.

Sta-Warm ELECTRIC CO.

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***NOW!* YOU CAN GET IMMEDIATE DELIVERY**

on The *FINEST* EJECTOR PINS Made!

DME HOTFORM and NITRALLOY EJECTOR PINS

CHECK THESE FEATURES!

HOT-FORGED HEAD for Added Strength

NITRIDED CASE for Longer Wear

ANNEALED HEAD that CAN BE DRILLED

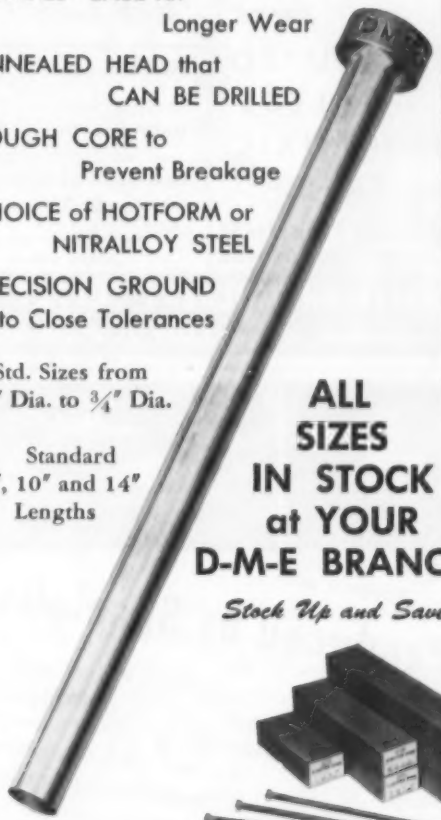
TOUGH CORE to Prevent Breakage

CHOICE of HOTFORM or NITRALLOY STEEL

PRECISION GROUND to Close Tolerances

Std. Sizes from 3/32" Dia. to ¾" Dia.

Standard 6", 10" and 14" Lengths



ALL SIZES IN STOCK at YOUR D-M-E BRANCH

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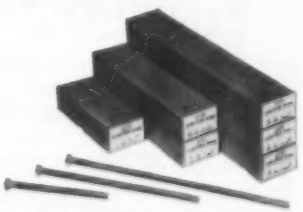

Consult your D-M-E Catalog for Data and Prices, . . . OR WRITE TODAY for DATA SHEET 521.

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The Best Mold Release You Can Buy! Forms a "Slick Quick"!

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NON-TOXIC
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Dry Freon Propellent Protects Your Molds

PRICES:

Sample Can ... $ 2.00
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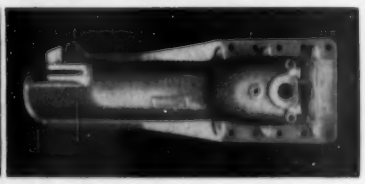

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Produced by Specialists

Good design combined with well cast, economically produced aluminum permanent mold castings are the keys to volume sales and bigger profits . . . And our job here at Aluminum Permanent Mold is designing and producing better castings for outstanding manufacturers of American civilian and defense goods. Pictured above are a permanent mold oil pan die and casting and truck trailer leg bracket. For finer castings large or small call in an Aluminum Permanent Mold Engineer.

For Aluminum Permanent Mold and Sand Castings it's

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PERMANENT MOLD CO.
1054 Front Ave. ■ Grand Rapids, Michigan

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four inches higher than the conventional litter. For this reason, the litter-cot is easier to grasp and pick up.

The cot is also four inches wider than the conventional litter; thus, the arms of the patient can be placed inside the litter-cot without having to be strapped. Also, these four inches give added comfort if the litter-cot is used as a cot over an extended period of time by a patient.

In the final design, the litter-cot became a rectangular frame of aluminum tube with die castings at each end and at the foot of each leg. The extended tubes that form the long sides of the rectangle pass through the circular bore of the corner die casting. A wooden handle enters this bore from the other side, completing the assembly. The aluminum tube, the corner die casting and the wooden handle are then pinned together. The cot is 7½ feet long, 26 inches in width, and in all weighs only 27 lbs. Between the length sections there is a strong canvas sling of olive drab. The order of 100,000 of these cots for New York Civil Defense will be finished in an olive drab color.

ALUMINUM INDUSTRIES NAMES NEW CONTROLLER

John W. Craig, president of Aluminum Industries, Inc., Cincinnati, Ohio, manufacturer of automotive engine and chassis parts, aluminum castings and aluminum paint, has announced the appointment of Robert Diefendorf as controller and assistant treasurer.

Mr. Diefendorf was with The Baldwin Piano Co. of Cincinnati as budget director during the past year. Prior to 1953, he was associated for several years with McKinsey & Company, management consultants in New York City, Before joining McKinsey & Company, he was with the United States Steel Corp. for ten years, during which time he held the position of Assistant Controller with several of the corporation's larger subsidiary companies.

MERRIMAN PROMOTES THREE EXECUTIVES

Three executive promotions have been made by Merriman Bros., Inc., Boston, Mass., producers of powdered metal parts.

G. Fred Ashworth, who has been with Merriman Bros. for 25 years, has been promoted from vice president to senior vice president.

Andrew J. Wayson, with the company 24 years, has been promoted from manager of the Powdered Metal Department to vice president.

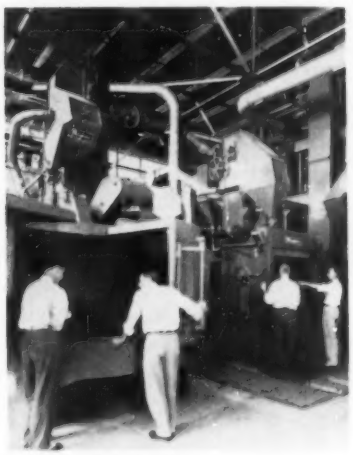
James B. Lindholm has been promoted from assistant treasurer to treasurer.

PANGBORN INCREASES DEMONSTRATION EQUIPMENT

Several important additions have been made to the equipment installed in the demonstration room, located at the Hagerstown, Md. plant of Pangborn Corp., manufacturer of blast cleaning and dust collecting equipment.

This room was developed by Pangborn in order to solve blast cleaning and dust control problems in the shortest possible time, through the operation of full size equipment of all types.

Complete reports are submitted to any customer who sends samples to the Pangborn demonstration room for cleaning. Castings, forgings and



heat treated parts have all been cleaned in the equipment on hand, to produce sample finishes.

When a report is made it includes recommendations for the correct blast cleaning equipment, exact sizes and types of abrasives to be used, exact duration of blast time, and other information.

Probably the best known new piece of equipment which has been added to the room is th Rotoblast Blastmaster Barrel, which has been developed by Pangborn for batch blasting of castings and is produced in sizes ranging from 3 to 27 cu. ft. capacity.

One Call Does It All!

A call to MD brings you direct to Metal Powder Headquarters and closer to the answer to your Powder Metallurgy problem.

For, as a pioneer in the manufacture of metal powders since 1916, MD has played a large role in the development of many of their uses in industry today as the *only* company which manufactures a complete line of metal powders. This has resulted in MD being the first source called on to supply an extensive line of powders for a wide range of applications.

Call on "Metal Powder Headquarters" for help on your metal powder problems. The advice and recommendations of the MD Sales Service Department are yours without obligation.

METALS DISINTEGRATING COMPANY, INC.
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METAL PIGMENTS
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U.S.A.'S LARGEST MANUFACTURER OF FINELY DIVIDED METALS

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ADVANCE

It takes EXPERIENCE as well as technical background to make Quality die castings. ADVANCE has thirty-three (33) years of die designing, die building and die casting experience under its belt to assure precision component parts that fit your product assemblies with minimum fuss, lower costs and on time.

That's why ADVANCE customers are both near and far. IT IS QUALITY THAT ATTRACTS ITS OWN.

Yes . . . some ADVANCE customers are over a thousand miles distant. After all, there can be no distance boundaries when experience and high quality die castings are needed.

33 years of service to industry

ADVANCE operates under the CERTIFIED ZINC PLAN of the American Die Casting Institute.

ADVANCE TOOL & DIE CASTING CO.
3760 N. Holton Street
Milwaukee 12, Wisconsin

DIE CASTING PREVIEW
continued from page 50

Mounting bosses are properly positioned and accurately enough cast so that the only operation to be done is drilling and tapping.

So that costs, both now and later as a die casting, will be as low as possible, normal shop tolerances and tapers are allowed throughout. This taper allowance makes it necessary to ream the lock hole as a secondary machining operation.

When the case was first designed, there was some doubt that the foundry would be able to hold the mating faces of the case and cover sufficiently flat to give a dust tight fit. A groove was, therefore, provided in the cover to take a rubber gasket. While this gasket is used, the foundry, in this case the Hale Foundry Co., has been able to make the parts with sufficient accuracy so that with only a light sanding the mating surfaces are adequate without the gasket.

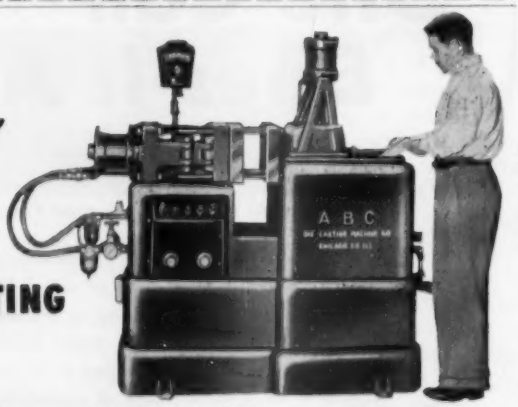
Again, for simplicity and lower second operation costs, a cast hinge is not used. Instead a sheet metal piano type hinge is fastened to the cover by riveting. The hinge is flush mounted and presents a better appearance than the usual cast hinge. After the case and cover are assembled the edges are given a light sanding to make sure that a smooth surface is presented when the case is closed and locked.

Except for one press operation which forms the knockouts for electrical connections the only machine work that must be done on the case is simple and inexpensive.

Surface finishing is with a wrinkle finish, baked paint so that the average surface from either a plaster mold casting or a die casting is adequate without either grinding or sanding except to remove flash

NEW!

HIGH SPEED
A.B.C. DIE CASTING
MACHINE



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Here's the new A·B·C high speed, low cost die casting machine which eliminates costly production of small die castings on large die casting machines. Air operated, the machine produces small non-porous lead, tin and zinc alloy precision die castings up to 1½ lbs.

The A·B·C is economical to operate and easy to set up. Its lightning production speeds makes single cavity molds practical and profitable.

STANDARD EQUIPMENT INCLUDES:
- 4 TIE BARS
- AUTOMATIC TIMING
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Write today for engineering data and prices. Ask for bulletin A-10.

A B C
DIE CASTING MACHINE CO.
339 W. 112th PLACE • CHICAGO 28, ILLINOIS

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and parting line marks. After painting, the cover is lightly sanded to remove the paint from the raised decorative portions.

This application of plaster mold casting illustrates how a product can be economically produced to simulate an ultimate die cast part without the high initial die costs that often preclude limited production.

DIE CASTING FIRM NAMES TWO V.P.'s

Two executive promotions have been announced by Clifford H. Simmons, president, Universal Die Casting & Manufacturing Corp., Saline, Mich.

Leroy A. Hughes has been elected vice-president of Universal in charge of all operations of Utilex Corporation, a subsidiary firm which manufactures plumbing hardware.

William K. Meister has been elected vice-president of Universal, in charge of all manufacturing of Universal Die Casting products, which consist principally of die cast parts for the automotive, agricultural equipment and appliance industries. Both Hughes and Meister will assume their new positions immediately, Simmons said.

William K. Meister

LAKE ERIE ENGINEERING OFFERS "PACKAGED INSTALLATIONS"

Lake Erie Engineering Corp. of Buffalo, N. Y., a leading producer of heavy industrial machinery, has just announced a newly created service by which industrial customers can purchase "packaged installations" of complete Lake Erie production equipment, set up in their plant, ready to operate.

As a part of this service, Lake Erie Engineering will survey the customer's hydraulic press or die casting requirements and make specific recommendations. They will design, manufacture, supply and install all the basic machinery, tools and dies, conveyors, loading mechanisms, furnaces and other related auxiliaries.

Their field force will install or supervise the installation of the complete equipment in the customer's plant — place the equipment in operation and train the supervisory and production personnel. Lake Erie Engineering will assume the responsibility for the satisfactory operation of the equipment as an integrated plant.

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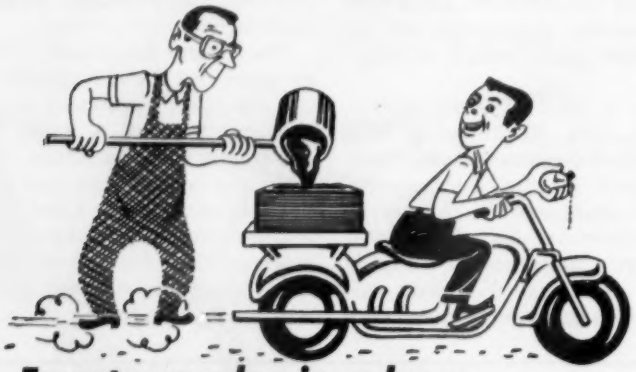

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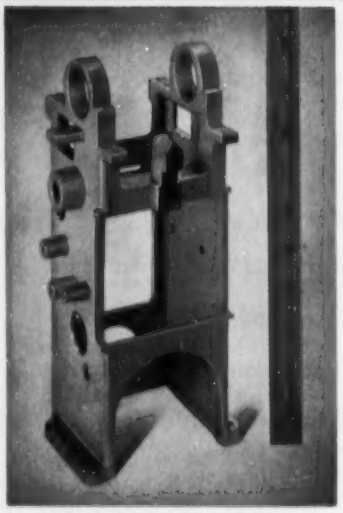

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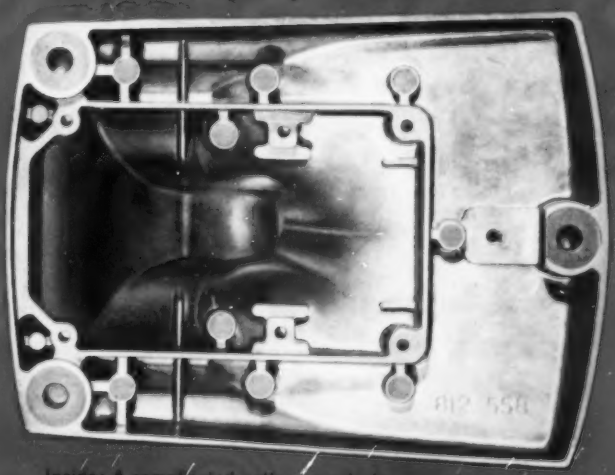

Inside: A complicated pattern precisely reproduced.

Changing from a cast-iron to a die cast base for one of their popular fan models has resulted in 10 specific benefits for this highly-pleased manufacturer.

Here they are, according to a company spokesman:

1. The elimination of "re-working" bases.
   a. A grinding operation to remove flash on the cast-iron neck.
   b. Heat treatment and sand blasting.

2. The elimination of spoilage due to breakage caused by chilling and/or hard spots.

3. The elimination of filling rough spots found in cast-iron castings.

4. The elimination of tapping four holes in the cast-iron bases. Die casting makes possible the use of self-tapping screws because of the softer metal involved.

5. Lighter die-cast bases make assembly line operations easier—save time.

6. Lighter die-cast bases provide a freight charge saving in the shipment of finished goods.

7. Lighter die-cast bases make stock room work easier—save time.

8. Die-cast bases, when stocked prior to entering our production line, are easier to stack because of more uniform base thicknesses—save time and storage space.

9. The smoother surface of die-cast bases, allow the usage of a smooth enamel paint—eliminate costly repainting.

10. Die-cast bases give a consistent quality with a high daily productive capacity.

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